

**Usability and credibility evaluation of electronic
governments: users' perspective**

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ABSTRACT

With the rapid development of the Internet and web technology, governments worldwide have caught onto this revolution and shown rapid development of electronic government (e-government) in the public sector. Nowadays, there are a significant number of e-governments that are accessible via the Internet and provide a range of information and services. However, existing research indicates that e-government still faces the challenge of generating greater users' interaction in terms of accessing information, utilizing services and participating in e-government decision making. Among a variety of reasons for this challenge, usability and credibility have been found to be the key factors in users' decisions about e-government engagement and need to be explored. This research attempts to evaluate the usability and credibility of current e-governments, focusing on specific e-government websites in the UK. This research adopted heuristic evaluation, which is based on users' perception, to implement a thorough and in-depth assessment of e-government websites. In addition, to obtain a more comprehensive evaluation, users' performance was measured in order to reveal the level of users' interaction with e-government websites when they perform a set of practical tasks. The research design was a quasi-experimental, consisting of two linked experiments. Experiment 1 aimed to evaluate usability and credibility of the target e-government websites, identifying a range of existing usability and credibility problems. Based on the usability and credibility problems found, design solutions were proposed for each of the target e-government websites. Experiment 2 aimed to examine the effects of the proposed design solutions on the usability and credibility problems identified on the redesigned e-government websites. The findings of experiment 1 suggested that the e-government websites need to improve their usability and credibility. In particular, the most serious usability problems found in the target e-government websites lay within the areas of "aesthetic and minimalist design", "recognition rather than recall", and "consistency and standards". In addition, the most serious credibility problems identified were within the areas of "site looks professional", "make site easy to use and useful", and "show the honest and trustworthy people behind the site". The findings of experiment 2 revealed that the usability and credibility problems found in experiment 1 had been improved by the proposed design solutions. Furthermore, these improvements might increase the overall usability and credibility of the target e-government websites,

making the users' task performance better within the redesigned e-government websites. Based on the findings of the experiments, this research developed a set of usability and credibility guidelines. Each guideline addressed a number of the specific usability and credibility elements at the detailed level of e-government website design. These guidelines can be helpful to guide designers to develop more usable and credible e-government websites.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The power of the Internet and web technology has been clearly demonstrated in the private sectors, such as e-commerce. Governments worldwide have caught on to this revolution and made significant efforts to develop electronic government (e-government) in public sectors. More recently, among the 192 member countries of the United Nations, nearly 98% of countries have built their web-based e-government systems (UN Public Administration Programme, 2010). Such a rapid development arises from the way that e-government has the potential to change the working environment of the traditional government to enhance access and delivery of government services. In such an environment, users have increasingly been able to interact with e-government by searching for government information and conducting government services without time and space limitations. Nowadays, there are a significant number of e-governments operating at national and local levels that are accessible via the Internet and provide a variety of online information and services (Gil-Garcia and Martinez-Moyano, 2007).

However, such a huge amount of information and services require quality control (Klischewski and Scholl, 2006). In particular, online information undergoes a process that enables everyone to edit and publish information via the Internet, which increases the possibility that information published is inaccurate, biased and misleading (Flanagin and Metzger, 2000). Thus, users' acceptance and utilization of information and services are largely dependent on source authority, accuracy and reliability. In this respect, e-governments provide government information and services, which need to indicate the trustworthiness of the governments behind them. Such trust can be significantly influenced by whether e-governments have demonstrated their credibility (Bélanger and Carter, 2008; Johnson and Kaye, 2009; Schmidt et al., 2007). As indicated by Fogg and Tseng (1999a), credibility refers to users' believability. The

strong users' belief that e-government provides reliable information generates greater trust in government (Welch and Hinnant, 2003). Therefore, with higher credibility, users may change their attitude (Wathen and Burkell, 2002), overcome uncertainty in their use of e-government services and enhance their interaction with e-governments. In this context, credibility is emerging as an important factor in determining e-government success (Sidi and Junaini, 2006) and a number of studies have been carried out to investigate credibility and trust of e-government. However, the results indicate that usability difficulties have a significant impact on credibility and users' trust of e-government (Carter and Bélanger, 2005; Huang et al., 2009; Weerakkody and Choudrie, 2005). It can be argued that there is a close interrelationship between credibility and usability (Fogg et al., 2001; Garcia et al., 2005; Nielsen, 2000).

Usability generally refers to ease of use and usefulness (Bevan, 1995). It is typically used to determine how easy and efficient it is for users to perform tasks by using the system. In many e-government studies, usability has been seen as the underlying catalyst for e-government adoption (Barnes and Vidgen, 2004; Kumar et al., 2007; Thompson et al., 2003). E-government with higher usability can make better civil service performance, increase users' satisfaction, and promote users' engagement with e-government services. Thus, a number of studies have been conducted to examine the usability in relation to e-government service quality (Gant and Gant, 2002; Magoutas et al., 2010; Wang et al., 2005), to investigate the functionality of e-government website (Donker-Kuijjer et al., 2010; Garcia et al., 2005; Kossak et al., 2001) and to explore the effects of usability on users' interaction with e-government (Anthopoulos et al., 2006; Barnes, 2004; Magoutas and Mentzas, 2010). The findings suggest that usability is also a key factor influencing e-government development, which need to be explored. Without addressing usability in e-government development, e-government will remain the challenging target of interacting with users.

In this vein, both usability and credibility have been found to be the important factors in determining e-government success, which need to be reflected to users through e-government websites. In other words, usability and credibility need to be importantly considered together and addressed on e-government websites. Therefore, usability and

credibility investigation of e-government websites has become paramount. By doing so, e-government can be accepted and used by a wider range of users. However, current research has not paid enough attention to inspecting usability and credibility of e-government. In addition, usability and credibility issues are not well understood at the detailed level of e-government website design, neither are the effects of users' interaction with e-government. As suggested by Huang et al. (2009), more research is needed in the aspect of usability and credibility evaluation of e-governments, measuring users' task performance with e-government websites, identifying existing usability and credibility problems and offering specific prescriptions for further usability and credibility improvement of e-government.

1.2 Research aim and questions

Given that usability and credibility have a close interrelation and are becoming key factors influencing users' interaction and engagement with e-government, it is necessary to evaluate usability and credibility of current e-governments to provide sound advice for designers to develop more usable and credible e-governments. In addition, it is important to identify what e-government features can cause users to have more concerns about usability and credibility, which is beneficial for designers to better understand users and their usability and credibility needs. It is also important for designers to understand users' interaction with e-governments when they perform a set of tasks within e-governments. Therefore, there is a need to carry out the usability and credibility evaluation of current e-governments, which not only provides a deep insight into e-governments usability and credibility, but also indicates the level of users' interaction with e-governments evaluated.

Thus, this research aims to evaluate usability and credibility of current e-governments, focusing on the specific e-government websites in the UK. The research questions are defined as:

RQ1: What are the existing usability problems in current e-government websites?

RQ2: What are the existing credibility problems in current e-government websites?

In addition, in order to fulfil a thorough usability and credibility evaluation study, according to the usability and credibility problems identified, this research provides the proposed design solutions and examines the effects of these proposed design solutions on each target e-government websites. The following research questions frame this part of the evaluation:

RQ3: What are the effects of the proposed usability design solutions on the usability problems on each target e-government website?

RQ4: What are the effects of the proposed credibility design solutions on the credibility problems on each target e-government website?

RQ5: What are the effects of the proposed design solutions on users' interaction with each target e-government website?

1.3 Research scope

Usability and credibility have been found to be the important factors in determining e-government success, which needs to be reflected to users through e-government websites. In this context, an e-government website serves as a window to communicate with users. It is representative of an e-government and provides both sides of users and government agencies with a single point of contact for online access to government information and services (Gant and Gant, 2002). A usable and credible e-government website reflects e-government usability and credibility. In other words, usability and credibility need to also be importantly addressed on e-government websites. Without addressing usability and credibility issues in sufficient detail to inform e-government website design, e-government will not be fully adopted by users. In addition, developing e-government with an effective website has a

significant impact on users' attitudes and their use. Accordingly, there is a need to conduct usability and credibility evaluation of e-government websites in order to increase e-government quality and promote users' acceptance of e-government.

However, e-government is used by diverse users with a variety of backgrounds, such as knowledge, skills and experience, which leads to various requirements of usability and credibility from e-government. Such different users' requirements raise the challenge of identifying usability and credibility by designers when developing more usable and credible e-government. In response to this challenge, user involvement indicates the user viewpoint, which is helpful to understand users and their usability and credibility needs. Furthermore, it can directly identify what e-government features can cause users to have most concerns about usability and credibility. Hence, there needs to be more attention directed towards users' assessment of usability and credibility of e-government, because such evaluation can provide concrete prescriptions to develop more user-centred e-governments that may support users achieving the desired services outcomes and so generate greater users' engagement.

Therefore, this study attempts to evaluate usability and credibility of current e-governments from users' perspective, focusing on the specific e-government websites in the UK. Given that the website is the interface for a specific e-government, each website can therefore be seen as a main channel for demonstrating its usability and credibility. Among the various evaluation methods, the primary method used in this study is the heuristic evaluation, as its usefulness has been validated by a number of studies. The heuristic evaluation is conducted based on users' perception of the sets of usability heuristics and credibility guidelines to implement a thorough and in-depth assessment of e-governments. In addition, users' performance is also measured in order to reveal the level of users' interaction with e-government websites when they perform a set of practical tasks. By doing so, it can provide a more comprehensive evaluation, which not only provides an insight into e-government websites usability and credibility, but also indicates users' task performance within the e-government websites evaluated.

The usability and credibility evaluation of e-governments is achieved through two linked experimental studies. Experiment 1 aims to evaluate the usability and credibility of current e-government websites. This experiment focuses on the usability and credibility evaluation in terms of the overall usability and credibility assessment, usability and credibility strengths and problems identification, and the measurement of users' task performance with the target e-government websites. In particular, according to the usability and credibility problems identified in experiment 1, the proposed design solutions are provided and designed for each target e-government website in order to improve their usability and credibility. Experiment 2 attempts to examine the effects of the proposed design solutions on the target e-government websites. It focuses on the usability and credibility evaluation in terms of the effects of the proposed design solutions on the usability and credibility problems in each redesigned e-government website, and the level of users' interaction with these redesigned e-government websites. Based on the findings of the experiments, this research has developed a set of usability and credibility guidelines, addressing a number of the specific usability and credibility elements at the detailed level of e-government website design. To address their validity, the guidelines have been also reviewed by professionals who are working in a local e-government. The value of this study contributes to two areas of knowledge, which are knowledge about usability and credibility, and knowledge about e-government website development.

1.4 Research methodology

To conduct the research, this study applies a quasi-experimental study as the research method, which combines both quantitative and qualitative approaches to collect data through the questionnaire and directed observation research techniques.

Experimental study is typically used to measure "cause and effect" relationship under controlled conditions and environments (Leedy, 1997). Within an experimental study, one situation can be altered by bringing an extraneous variable into it. Each situation can be re-evaluated after the intervening alteration. The changes in re-evaluation can be caused by the extraneous variable. This feature is particularly suitable for the

purpose of this study because this study aims to evaluate the usability and credibility of the e-government websites, identifying the usability and credibility problems. Based on the problems found, the study provides the proposed design solutions. Then, it attempts to re-evaluate the usability and credibility problems under the controlled conditions in order to indicate whether or not the proposed design solutions cause the problems to be solved. Generally, experimental methods are sorted into the true experiment, the quasi-experiment and the ex post facto experiment (McQueen and Knussen, 2002). The quasi-experimental study is considered as the appropriate research method since the non-random sample is drawn from the population. In this study, the participants are allocated and balanced in different treatment groups according to the participants' demographic information, such as gender and age. In addition, the researcher cannot dictate all circumstances and needs to take the role of observing research event (Denscombe, 2007).

To carry out the evaluation, both quantitative and qualitative approaches are applied to the study. As indicated before, the evaluation consists of the heuristic evaluation and performance measurement. The former is based on users' perception to implement a thorough and in-depth assessment of the e-government websites, while the latter applies a set of performance criteria to measure users' task performance in order to indicate the level of users' interaction with the e-government websites evaluated. The mixed research approach with emphasis on quantitative approach can provide a broad perspective to address the evaluation purposes. In addition, the advantages of the mixed approach may help to gain the more comprehensive and richer evaluation results.

To collect research data, the questionnaire and observation research techniques are employed in the study. These research techniques can be used to approach the research questions from different aspects. More specifically, the questionnaire aims to capture users' perception to assess the usability and credibility of the e-government websites. The observation is used to measure users' task performance in order to indicate the level of users' interaction with the e-government websites.

1.5 Structure of the thesis

The remainder of this thesis is structured as follows:

Chapter 2 reviews existing literature to demonstrate the importance of usability and credibility to e-government development. This chapter starts with the provision of general background of e-government. Then, it examines relevant studies to indicate that usability and credibility are two key factors in determining e-government development. After that, the interrelationship between usability and credibility has been explored. This is followed by the research gaps identification and the research questions development. Finally, it indicates that there is a need to conduct usability and credibility evaluation of e-government websites in order to develop more user-centred e-governments.

Chapter 3 identifies the evaluation methods used in the study. Two evaluation methods consist of the evaluation, which are heuristic evaluation and performance measurement. To conduct heuristic evaluation, Nielsen's set of usability heuristics and Fogg's set of credibility guidelines have been used as a starting point. However, in order to meet the particular needs of e-government, these existing Nielsen's heuristics and Fogg's credibility guidelines are extended. In addition, a set of performance criteria has also been identified in order to implement performance measurement.

Chapter 4 indicates that the experimental study is considered as the appropriate research strategy employed in this study. To conduct the study, a mixed research approach with emphasis on the quantitative approach is implemented. Both quantitative and qualitative data are collected through the questionnaire and observation research techniques. In addition, the descriptions of the research instruments and research design of two experiments are provided in this chapter. These include e-government websites selection, the task sheet design, the usability and credibility evaluation questionnaire design, variable measurement, participants, research environment and material, experimental procedure, pilot study and data analysis techniques employed for the study.

Chapter 5 presents the results of experiment 1. It starts with the descriptions of the participants and their responses in order to indicate that the distribution of the participants and their responses is unbiased and follows a normal distribution respectively. Then, the results of the usability and credibility assessment of each target e-government website are reported. This assessment covers the overall usability and credibility evaluation, the strengths of usability and credibility detection, and the usability and credibility problems identification. After that, the results of users' performance with each target e-government website are presented.

Chapter 6 is based on the analysis in Chapter 5 with the purpose of solving the usability and credibility problems detected from the target e-government websites. It provides the detailed proposed design solutions for each usability and credibility problem found in experiment 1 and designs these proposed solutions on each target e-government website.

Chapter 7 reports the findings of experiment 2. It follows a similar pattern used in Chapter 5, which begins with the descriptions of the participants and their responses in order to indicate that the distribution of the participants and their responses in experiment 2 is unbiased and follows a normal distribution respectively. Then, it describes the results in terms of users' perception and users' performance. Users' perception is captured by both quantitative and qualitative data through the closed and open-ended questions of the questionnaire to indicate the effects of the proposed design solutions on the usability and credibility problems. Users' performance is measured by observation in order to reveal the level of users' interaction with the redesigned e-government websites.

Chapter 8 describes a general discussion of the findings from both experiment 1 and experiment 2. Based on the analysis of the findings from the study, a set of usability guidelines and a set of credibility guidelines are developed to guide designers to address usability and credibility in relation to e-government website design.

Chapter 9 provides the conclusion of the study, which consists of the review of the research questions, contributions of this study, limitations of the research and further suggestions for future research work.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Following the Internet 'revolution' and the widespread adoption of web technology, web-based online systems have been increasingly developed in our daily life. In particular, e-government is becoming the important part of the revolution applied in the public sector. More recently, there are many e-governments operating at national and local levels that are now accessible via the Internet and offer a variety of information and services available online (Gil-García, 2005). Such a rapid growth arises from the way that e-government has the potential to change the working environment of the traditional government to enhance access and delivery of government services. In this environment, users can search for government information and interact with government services without time and space limitations. Therefore, e-government nowadays has become an important channel to connect government with users (Homburg, 2008).

A number of studies that investigate users' interaction with e-government indicate that improving e-government's service in terms of trustworthiness (Bélanger and Carter, 2008; Tolbert and Mossberger, 2003; Warkentin et al., 2002), information reliability (Welch and Hinnant, 2003), system credibility (Huang et al., 2009), site ease of use (Kossak et al., 2001), and interface friendliness (Baker, 2009; Garcia et al., 2005) can obtain a large number of benefits for the e-government development, especially generating greater users participation. In this aspect, usability and credibility are emerging as the key factors in influencing users' engagement with e-government (Choudrie and Ghinea, 2005; Bélanger and Carter, 2008) and determining e-government success (Barnes and Vidgen, 2004; Sidi and Junaini, 2006). However, existing research has not paid enough attention to investigating usability and credibility of current e-governments. With the rapid development of e-government, in order to achieve that e-government can be used and accepted by a wider range of

users, it is important to consider usability and credibility of e-government. In addition, an e-government website serves as a window to communicate with users. It is representative of an e-government and provides both users and government agencies with a single point of contact for online access to government information and services (Gant and Gant, 2002). A usable and credible e-government website reflects e-government usability and credibility. In other words, usability and credibility need to be also importantly addressed on e-government websites. This becomes an important issue to be focused on in this research. This chapter therefore reviews existing literature to scope the research areas and examines relevant studies to demonstrate the importance of usability and credibility to e-government development.

Chapter 2 is structured as follows. Section 2.2 reviews relevant literature to provide general background to e-government. This is followed by examining the effects of usability and credibility on e-government and e-government users in section 2.3 and 2.4 respectively. Section 2.5 describes the interrelationship between usability and credibility. Section 2.6 identifies the research gaps from previous studies and indicates the research questions. Finally, a brief summary and conclusion is presented in section 2.7.

2.2 E-government

With the rapid development of the Internet and web technology, users have increasingly been able to interact with web-based online systems. Among a variety of web-based online systems, e-government is becoming part of the revolution applied in the public sector. Nowadays, e-government makes significant attempts to deliver their services to citizens, business and other government agencies via the Internet (Tambouris et al., 2001). There are many varying definitions of e-government. Some explain e-government from an organisational focus (e.g. Heeks, 2002), some define it from a functional focus (e.g. Homburg, 2008), some classify it from a governmental focus (e.g. Wamukoya, 2000; OECD, 2003), and some define e-government from a business process focus (e.g. Holmes, 2001). These definitions adopted by individuals or organisations have slightly different, because the priorities and focuses of e-government have shifted. In this study, for the purpose of addressing a dynamic area

of e-government and its application for the general public, e-government is therefore defined as the use of the Internet, especially web technology as a tool to deliver government information and services to users (Muir and Oppenheim, 2002).

E-government initiatives are evolving from the national to the local level (West, 2005). Generally, national governments have started adding technology and moved toward more sophisticated e-government, and local government have followed (Gil-Garcia and Martinez-Moyano, 2007). All e-government services within the national and local levels can be conducted via information presentation, interaction, transaction and integration (Layne and Lee, 2001; Yang and Paul, 2005). The benefits of e-government can increase service delivery (Mutula and Wamukoya, 2007); transparency (Ciborra, 2005); civil service performance (Kumar et al., 2007); policy effectiveness (OECD, 2003); strengthen citizen trust (Eyob, 2004) and achieve big cost savings (Culbertson, 2002).

2.2.1 E-government development

E-government development is strongly driven by both traditional government requirements and information technology evolvement (Strejcek and Theil, 2002; Torres et al., 2005). Regarding traditional government, organisation is complex and a mammoth bureaucracy (Cairns et al., 2004). It makes access to information difficult and makes provision of services cumbersome and frustrating for users (Cairns et al., 2004). In particular, there has been much cynicism of government services, which leads to low public participation and trust in government (Eyob, 2004). Users expect to establish a new approach to achieve a better government, which enables easier access, richer information resources, higher quality services and enjoyable participation (OECD, 2003). As such, government is required to change the way of administering and processing official business (Yang et al., 2005), delivering government services (Barnes and Vidgen, 2004), and generating greater efficiency for all participation (Kumar et al., 2007). In response to these requirements, e-government becomes an outstanding solution (Kelly and Tastle, 2004; Metaxiotis and Psarras, 2004; OECD, 2003).

In support of e-government initiatives, traditional government has released a number of information policies and strategic plans, such as E-government Strategic Framework; Security e-Government Strategy Framework Policy; E-government Intermediaries Policy in the UK (Cabinet Office, 2000), the European Committee's eEurope 2005 Action Plan, the US Federal Government's e-Government Action Plan, the German Federal Government's BundOnline (Anthopoulos et al., 2006), which are helpful to guide government from making information-based plan to building e-government system, from implementing e-government application to improving e-government functionality (Yang et al., 2005). Furthermore, traditional government provides large financial support for e-government projects development. For example, the government of Canada allocated \$880 million from 2000 to 2005 to support e-government projects (Kumar et al., 2007). In Singapore, the government demonstrated strong economic support to ensure e-government program objectives, which earmarked \$932 million over three year (2000 to 2003) (Ke and Wei, 2004). The U.S. government spent about \$6.2 billion to support e-government development in 2005 (Gil-Garcia, 2006).

Moreover, the rise of information technology accelerates e-government development. Initially, the use of technology in government organisation is based on personal computers, which aims at improving the managerial effectiveness of public administration and increasing government productivity (Yildiz, 2007). After a short time, the automation of mass transaction is introduced for financial transaction throughout mainframe computers in government (Schelin, 2003), which speeds up government business processes. However, it remains an isolated environment, where government agencies operate the computer system independently from each other (Bouwman et al., 2005).

In the 1980s, a variety of efforts relating to internal communication were added to the government information technology applications. These included development with the purposes of supporting information sharing management and collaboration, for example expert systems (ES) (Perru, 2004), electronic document interchange systems (EDI), and geographic information systems (GIS) (Cinderby et al., 2002). With the diffusion of personal computers in the early 1980s, each administrator was allocated a PC with a personal information system. Such evolvement entered a new stage of

information technology use in governments, in which the first step towards front and back office function was established. This front and back office function becomes fundamental to changing government “modus operandi” (Bellamy and Taylor, 1998). However, the main technology issue indicates that technology management is decentralised in government agencies. At this point, information technologies need to be centralised and integrated to the core functions in governments (Yildiz, 2007).

In the 1990s, the emergence of the Internet can be seen as the underlying catalyst for e-government development. In the first few years, the Intranet was widely applied to government since it provided the networking infrastructure that connects numerous government computers together. However, this managerial information technology primarily focuses on the internal side of government (Yildiz, 2007). In support of the external communication, electronic mail systems (e-mail) were introduced in many departments and governments. Although it encourages external communication, when users send questions or provide comments through e-mail, this still hardly influences the internal government and its communication processes. One of the major reasons for this lack of effect is email as a one-way contact (Bouwman et al., 2005).

With the advent of web technology and the availability of broadband services, the way that users contact government has been significantly changed. In particular, the web develops the service system that can be universally accessed through a web browser (Mutula and Wamukoya, 2007). In this way, the web offers a means of accessing and sharing information on the Internet for the general public. Since such advantages have become apparent, governments worldwide have caught onto this revolution and shown rapid development of web-based e-government in the public sector. For example, the number of e-government websites worldwide has increased from 142 in 1995 to more than 50,000 in 2001 (Kumar et al., 2007). The number of worldwide e-government programs has increased from 3 in 1996 to more than 500 national initiatives in 2000 (Al-Kibsi et al., 2001). Today, among the 192 member countries of the United Nations, nearly 98% of countries have built their web-based e-government systems (UN Public Administration Programme, 2010).

2.2.2 E-government development in the UK

In the UK, e-government is not only a matter of choice, but also a necessary strategy for a country that wants to enter the 21st century as a competitive nation in the world. The government at all levels implements information communication technologies (ICT) to transform the structure, operation and the culture of traditional government (Beynon-Davies and Williams, 2003). The central government employs a number of activities to promote e-government development. For example, the national strategic scheme of “Joined-up government” uses information technology tools to provide information, engage in two-way interaction, establish and disseminate knowledge to a network of stakeholders (Kolsaker and Lee-Kelley, 2006). The “Modernising Government” project aims to make 100% of government services available online in 2005 (Cabinet Office, 2000). The “Implementing Electronic Government” program requires e-government applications across all the local level of government in the UK (Beaumont et al., 2005). By implementing these activities and programs, e-government has been encouraged to develop nationwide and evolved from national level to local level in the UK.

On the other hand, based on the e-government regulations and goals set by the central government, local authorities in the UK have reformed network and developed their own structure, and services delivery systems (Beynon-Davies and Williams, 2003). For example, local authorities across Surrey County develop a joined e-government project, with the constitution of the Surrey e-Partnership, which involves 47 organisations from local authorities, health services, higher education and crime and disorder to deliver government services to users. Within the development, the service delivery method in local governments was moved from a technology-centred approach to a governance-centred approach (Medaglia, 2006).

These e-government developments draw much attention from academic research. Many researchers propose the progressive stages of e-government evolution and attempt to use these stages to identify the current e-government status. These stages mainly involve information presentation; interaction; transaction and integration. (e.g. Deloitte and Touche, 2001; Hiller and Bélanger, 2001; Layne and Lee, 2001; Moon, 2002; Murphy, 2005; Siau and Long, 2005). Daniel and Ward (2006) reported that the

UK e-government have already built the infrastructure and offered a range of services. Users can easily access e-government and engage in their service transaction through a single portal. In particular, the portals provide an environment in which information can be extracted from existing applications and shared with different departments. Such provision indicates integrated services delivery. However, the challenge of “joined-up” services exists. As such, they suggest that the UK e-government is in the stages between transaction and integration. Furthermore, Dhillon et al. (2008) defined four stages: access and connectivity, services provision, transformation and next generation, and used them to observe e-government development in the UK. The research shows that although e-government moves to a transformational stage, the business process barriers exist, which still follows the inherent processes. In addition, the use of information systems and technology is inefficient, which causes barriers in collaboration between government agencies. As such, there is much scope for UK e-government further development in order to achieve the fourth or final stage, in which government business processes, services and systems can be entirely integrated at different levels and from different departments.

Therefore, these e-government studies imply that there is a rapid development of e-government in the UK. The UK governments at both national and local levels can be accessed through the Internet (Weerakkody and Choudrie, 2005), and make a variety of government information and services available online (Daniel and Ward, 2006). In addition, it provides users with two-way interaction with government throughout e-government websites (Senyucel, 2005).

2.2.3 E-government websites

Given that government information and services are delivered through e-government websites, these websites can therefore be seen as the interface of the e-government, serving as a window for users to communicate with government (Gant and Gant, 2002; Weerakkody and Choudrie, 2005). The website is representative of an e-government and provides both sides of users and government agencies with a single point of contact for online access to government information and services (Thomas and Streib, 2003; Yang and Paul, 2005). In this respect, e-government websites play a central role

in e-government development. Alongside e-government development, e-government website functionality has significantly evolved. Initially, the website is simply used to classify and publish government information. However, the website matures quickly and increases functionality by adding advanced search facility (Horrocks and Hambley, 1998), personalised website content (Mosse and Whitley, 2009), user control (Barnes, 2004; Kossak et al., 2001) and online service transaction (Daniel and Ward, 2006). In recent years, website functionality is underlying e-government integration (Gant and Gant, 2002; Layne and Lee, 2001). With high levels of integration, e-government websites can be developed as the government gateway that enables seamless access to government services across different departments. In such conditions, users can simply follow a single registration process to involve in online government services, rather than visiting and registering with numerous different websites according to their services required (Dwivedi and Williams, 2008). An e-government website has the potential to change the way that users access and interact with government, which can help with the provision of government services, improve communication and encourage users' participation in government decision making (Gil-Garcia, 2006; Howard, 2001; Kolsaker, 2006).

Today, e-government websites are a key priority for governments when they develop their e-government system and create electronic relationships between government and citizens, businesses, government employees and other agencies (Barnes, 2004; Gant and Gant, 2002; Garcia et al., 2005; Tolbert and Mossberger, 2003; Wang et al., 2005). Government have paid much attention to developing e-government websites. For example, 30% of e-government projects are focused on website development in the UK (Beynon-Davies and Williams, 2003). Furthermore, there are a large number of users who are using and have been willing to engage in e-government website services. For instance, Mosse and Whitley (2009) reported that over 300,000 users visit the Department of Children, Schools and Families website every month in the UK. In addition, a survey by Larsen and Rainie (2003) indicated that about 60% of respondents prefer to choose e-government to deal with their requests.

However, with the rapid development of e-government and a large number of users who are willing to use e-government, there is still a big challenge for e-government to interact with users (Følstad et al., 2004; Kossak et al., 2001; Kumar et al., 2007;

Weerakkody and Choudrie, 2005; Yildiz, 2007). Among the various reasons, evidence from existing literature suggests that usability and credibility have been found to be two of the major reasons influencing users' interaction and adoption of e-government (Al-Omari and Al-Omari, 2006; Barnes, 2004; Bélanger and Carter, 2008; Donker-Kuijer et al., 2010; Henriksson et al., 2007; Parent et al., 2005; Sidi and Junaini, 2006; Thompson et al., 2003; Welch and Hinnant, 2003). The following sections look at literature and relevant studies to detail the concept of usability and credibility and indicate their effects on e-government development.

2.3 Usability

Usability is a well-known concept in Human-Computer Interaction research. It is typically used to measure how easy and efficient it is for users to perform tasks when using a product (Han et al., 2001). Evidence from previous studies indicates that usability is an important factor in determining product quality (Bevan, 1995; Karahoca et al., 2010; Park and Lim, 1999), and ensuring users' engagement (Lee and Koubek, 2010; Sauer and Sonderegger, 2009). Therefore, usability has been widely addressed in products and system design.

2.3.1 Usability concept

Usability is a very broad concept in system design (Gillan and Bias, 2001). According to the International Standard Organisation (ISO, 1998), IT system usability refers to the effectiveness, efficiency and satisfaction with which the specified users achieve specific goals in the specified context of use. However, within the usability engineering context, usability is defined as the quality of a computer system in terms of ease of learning, ease of use and user satisfaction (Rosson and Carroll, 2002). In the context of web-based online systems, usability reflects the perceived ease of understanding the structure of a system, simplicity of use of the website, the speed of locating the item, the perceived ease of navigating the site, and the ability of the users to control their movement within the system (Flavián et al., 2006).

With the widespread use of websites, websites serve as the interface to the web-based online systems. Usability concepts have been also importantly addressed for website interface (Ghaoui, 2000), which is defined as a measurement related to how useful and user-friendly the system is. In detail, usefulness is the degree to which users think that using the particular system can improve their performance (Kumar et al., 2007). User-friendliness is the perception of aesthetic design with respect to website interface features (Matera et al., 2002). However, such website interface usability can be extended in order to obtain more comprehensive explanations. Therefore, some studies use multiple criteria to explain usability concepts. For example, Nielsen (1993) explained website usability as the ease of learning the site, memorising the site functions, the efficiency of the website design, the degree of errors protection and the general satisfaction of users. In addition, Henriksson et al. (2007) addressed six categories in website usability, which are the content readability, the ease of websites' navigation, the robustness of forms within the site, disability access to the site, compatibility with older systems and the user-friendliness of the site. Furthermore, Lee and Koubek (2010) identified five criteria to measure usability of web design, including content organisation, navigation systems, visual arrangements, typography and colour application. Although the concepts of usability of a website have been explained differently, these multiple criteria used in these studies allow researchers to have a broad understanding of usability.

As a result, several studies suggest specific requirements or guidelines to assist in website design (e.g. Head, 1999; Nielsen, 2000; Pearrow, 2000; Spool, 1999; Wang, 2001), in which their requirements or guidelines focus mainly lies within usability. By detailing usability in these guidelines, the definition of usability moves away from imprecise concepts, such as ease of use and usefulness, towards a more comprehensive view that supports specific usability identification. For example, Nielsen (1994) developed a set of guidelines, covering a range of the specific usability features in relation to website design. These include visibility of system status; match between system and the real world; user control and freedom; consistency and standards; error prevention; recognition rather than recall; flexibility and efficiency of use; aesthetic and minimalist design; errors recovery; and help functions. By developing such guidelines, it can be helpful to focus usability on specific aspects and create websites with high levels of usability.

Although the aforementioned studies present the extensive concept of usability in a variety of systems, it seems clear that usability is an important factor in construction of the system design. As indicated by Lee and Koubek (2010), a successful and preferable website generally refers to one with high usability. This is also supported by Park and Lim (1999, p.379), who stated that “usability has become a primary factor in determining the acceptability and consequent success of computer software.”

Furthermore, evidence from previous studies demonstrates that among a variety of electronic systems, such as e-banking (Weir et al., 2007), digital libraries (Tsakonas and Papatheodorou, 2008), health-care systems (Rose et al., 2005), e-commerce (Lee and Koubek, 2010) and e-learning (Chiu et al., 2005), usability has been commonly considered as a key element in determining system or service quality (Casaló et al., 2008). For example, in order to ensure the quality of software developed for a Tablet personal computer that can keep electronic health records of patients errorless and accessible through mobile technologies in hospital, usability evaluation is primarily focused on during product development (Karahoca et al., 2010). Equally, Bevan (1995) emphasised usability in electronic system design. In particular, they identified that the usability attributes which contribute to quality of system use include the style and properties of user interface, the dialogue structure, and the nature of the functionality. Accordingly, the study suggests measuring usability as quality of system use. Another study conducted by Han et al. (2001) found that the system performance, such as efficiency and effectiveness to achieve the target task goals, and image and impression such as sense or feelings about a system are closely associated with usability. Users generally focus on these aspects to judge the quality of system design. Without an emphasis on usability, systems are often not accepted by users.

In essence, usability can directly influence users' preference, opinion and attitude. For example, Lee and Koubek (2010) conducted a study to investigate the effects of usability and web design attributes on user preference. The study found that a high level of usability results in a high level of user preference toward the website. In particular, user preference was largely dependent upon web attributes in terms of content arrangement, navigation function, visual organisation, typography and colour usage. Additionally, Casaló et al. (2008) demonstrated that website usability not only

has a direct and positive influence on user satisfaction, but also builds user trust in the website loyalty formation process.

Moreover, usability design also has big impacts on user performance and interaction with systems. Sonderegger and Sauer (2010) detected a number of usability attributes, such as the attractiveness and the visual appearance that influences users' performance in terms of task completion, interaction efficiency and error rate with mobile phone systems. In addition, Benbunan-Fich (2001) showed that the major aspects that hamper the efficiency of the users' interaction with the website are content problems, such as cluttered design and poor readability, and navigation problems, for example confused buttons. In particular, interactivity elements, such as the length of the process negatively affect the possibility that users will return to the site or make a purchase.

Furthermore, failure to provide usability design may also have negative economic impact. Nielsen (2001) found that electronic shops lose about half of their potential sales due to insufficient usability design. Tsakonas and Papatheodorou (2008), who investigated the quality of a commercial website and analysed users interaction, found that the quality of the website is concerned with usability, which in turn, significantly influences users' performance with the website. In particular, users fail to choose products because of crowded content and poor navigation design. In addition, Tilson et al. (1998) required users to list the factors influencing their decision to purchase on an e-commerce website. Among 50 different factors listed, 27 factors relate to the usability of the website design, such as feedback to confirm that the order has been received, the ability to go back and edit the purchase order list, and search results presentation in a usable format.

2.3.2 Usability effects on e-government

In terms of e-government, usability has been shown to be important in services quality, website design and e-government structure development. Regarding service quality, Gant and Gant (2002) found that the provision of service in e-government relies on web functionality since all sorts of government services are produced through e-

government websites. A high level of website functionality can ensure service delivery value for users. Such value can be achieved by giving attention to usability, customization, openness and transparency. In particular, features, such as intuitive menu systems, site maps, new information indicators, search tools, common government logo, uniform masthead and help function are important for usability construction in order to support service quality provision.

Similarly, Garcia et al. (2005) found that service quality is based on e-government constitutive characteristics: information distribution, service offer and users' participation. Usability can effectively measure services offered in relation to these three aspects. Thus, apart from the traditional usability criteria, such as user control, visibility of system status and aesthetics design, Garcia et al. (2005) derive extra usability criteria, including accessibility, interoperability, security and privacy, information truth, service agility and transparency to assess the e-government service quality.

Moreover, Magoutas et al. (2010) showed that the quality of e-government portal and service represents e-government quality. To explore the quality of e-government portal and service, four quality factors have been identified including usability, forms interaction, support mechanisms and security. The results indicate that by focusing on these quality factors, e-government quality is maintained. In particular, the system's usefulness in an e-government portal adds to the value of e-government quality. To achieve a useful e-government portal, the following features of portal structure, layout, URL, search engine capability, site map and customization need to be addressed.

With respect to the requirements of usability of e-government website design, Baker (2009) reported that without addressing usability in e-government websites, e-government is still facing a major challenge in interacting with users. To understand usability, six dimensions that impact on overall e-government website usability have been explored, including online services, user-help, navigation, legitimacy, information architecture and accessibility. More specifically, online services require the services quality offered by e-government. User-help identifies mechanisms that facilitate satisfactory electronic contact and interaction. Navigation provides user with guidance through the website readily to specific destinations. Legitimacy features,

such as security policy and privacy statement, are required to demonstrate that a website is particularly designed to conduct official government business. Information architecture addresses information structure and organisation so that it can be clear for users. Accessibility allows easy access for users with disability.

Moreover, Kossak et al. (2001) investigated e-government application for a large and diverse community of users. The results summarized that usability is becoming a key factor for e-government applications, especially in the consideration of users' requirements of website. The study finds that the major usability issues are in terms of users' control, users' memory load and interface consistent, which need to meet users' needs. Therefore, usability should be implemented not only in site design, but also in content design to present different content legibly with acceptable response time.

The importance of usability to e-government website design is also reflected in a study conducted by Donker-Kuijer et al. (2010), which indicated that an e-government website is regarded as a promising means to increase users' involvement and promote service efficiency. Usability is the factor that increases or ensures the quality of the e-government website. To achieve high quality of e-government website, usability needs to be regularly examined in all parts. This is also echoed by Henriksson et al. (2007), who revealed that usability consists of the quality of government websites. To pay attention to usability, there are a range of features that need to be carefully considered, which includes text readability, consistent layout scheme, ease of navigation and accessibility for various levels of user capability.

Furthermore, a number of studies have addressed usability in relation to e-government structure development. A study conducted by Schedler and Summermatter (2007) indicated that current e-government structure is required to switch from service orientation to user orientation because users are the focus when developing e-government. However, in order to focus on users and explore their needs, the development of a website that is easy to use is a way to create users' value. Therefore, for developing user-oriented e-government websites, usability features, such as site maps, search facility, multilingualism and friendly printer version are important components to support that the site easy to use. In addition, Searson and Johnson (2010) showed that current e-government development strategy focuses on two-way

symmetrical communication of e-government, so that government and the public adjust and adapt to each other for mutual benefit, rather than government using one-way persuasive communication to empower the organisation and force its goals onto its stakeholders. However, in order to implement such two-way e-government development, usability has been found to be one of the major aspects. Such usability can be achieved by providing search facility, font adjustment options, FAQ section, page formatting for printing and site map.

2.3.3 Usability effects on e-government users

The usability of e-government has profound impacts on users' satisfaction, expectation and perception. For example, Magoutas and Mentzas (2010) conducted a study that monitors the degree of users' satisfaction with e-government services. The findings imply that users' satisfaction of e-government is significantly influenced by forms interaction, website usability, security, information quality, service reliability and support mechanisms. This is also reflected by Verdegem and Verleye (2009), who investigated users' expectations about e-government. Based on a large sample (5590 respondents), the results show that users' preferences closely relate to usability in terms of the degree of access of e-government services, findability of the e-government website, loading speed of the pages, the usefulness of information provided on the site and flexibility that is being offered through the e-government website. A high level of usability makes better users' expectation, which have a decisive effect on use of e-government services.

Another similar study by Kumar et al. (2007) emphasised that the key driver of users' e-government adoption is usability. Such usability reflects users' perception of usefulness of the online information, services provided by e-government and how easy it was for users to access, navigate and consume the information and services on e-government.

Furthermore, providing effective usability design significantly influences users' interaction with e-government. Barnes (2004) investigated the elements impacting users' intention to use the Inland Revenue website in the UK. The results showed that

the users' intention to apply the e-government website is strongly determined by whether the site demonstrates ease of learning, ease of navigation, ease of use, provision of accurate, believable, understandable information, and safe transaction. The majority of these elements lie in the usability. In another study, Barnes and Vidgen (2004) observed users' interaction with an online government tax self-assessment facility. These findings show that users' activities, such as online submission of self-assessed tax returns and information seeking are largely concerned with usability, navigation, and site communication. In order to generate greater users' interaction, there is a need to not only understand the usability requirements of users, but provide tailored solutions to improve the usability of these e-government websites.

Anthopoulos et al. (2006) applied participatory design to discover user-oriented e-government services. The study addresses the importance of users' needs in order to guide service delivery improvement. Usability has been found to be the determinant in consideration of users' requirements, because if users failed to access and execute the proper service due to usability errors, their dissatisfaction increased. Such dissatisfaction may prevent users' return to an e-government website, and even that users do not recommend their use to others.

Similar results are reported by Kumar et al. (2007), who studied factors influencing successful e-government adoption. The authors propose a conceptual model to analyse the influence of users' acceptance of e-government, including website design, service quality, users' satisfaction and users' characteristics. The results indicate that website design, in terms of usefulness and ease of use, acts as the vital element, which not only influences users' experience and satisfaction, but also positively affects users' interaction with e-government. Therefore, the authors suggest that improving website design, especially in terms of navigation, aesthetics, content, accessibility and personalisation is very likely to encourage users' adoption of e-government.

To summarise, the set of studies reviewed in this section indicate the importance of usability to e-government, and the effects of usability on users' attitude, perception and interaction. The findings of these studies suggest that usability is considered as a key factor in determining e-government success, which needs to be addressed when developing e-government.

2.4 Credibility

Credibility is another important factor in determining users' engagement with e-government (Al-Omari and Al-Omari, 2006; Bélanger and Carter, 2008; Parent et al., 2005; Sidi and Junaini, 2006; Welch and Hinnant, 2003). Initially, credibility is discussed as a theoretical construct in the field of communication under the name of "source credibility theory" (Robins and Holmes, 2007). However, recent research has adopted credibility in the field of Human-Computer Interaction (Flanagin and Metzger, 2003), and expanded on source credibility to explain interaction with information systems (Johnson and Kaye, 2009; Rains and Karmikel, 2009) and interaction with information (Dutta-Bergman; 2004; McKnight and Kacmar, 2006; Yang, 2007). The detailed concept of credibility and its effects on e-government are presented in the following sub-sections.

2.4.1 Credibility concept

Although credibility is a complex concept (Liu and Huang, 2005), it can be simply defined as "judgments made by a perceiver concerning the believability of a communicator" (O'Keefe, 2002, p.181). Rieh (2002) defined credibility as trustfulness, reliability, accuracy, authority and quality. It can be argued that there are two fundamental factors that are closely related to credibility: trustworthiness and expertise (Hillgoss and Rieh, 2008). The former is about reliability (Fogg and Tseng, 1999a), while the latter is related to user' perception of source knowledge and skills (Fogg, 2003). However, some studies tend to use multiple criteria to explain source credibility, which allows for a more detailed judgment. For example, Burgoon et al. (2000) identified five dimensions of credibility: competence, character, composure, dynamism and sociability. In their explanation, competence refers to demonstrating expertise and authoritative; character is related to communicator' truthfulness and reliability; composure and dynamism may be implicated by indicating a dominant and extroverted communicator; sociability is about friendly and likable perception. Moreover, Fogg (2003) outlined four types of credibility, which are presumed

credibility, earned credibility, surface credibility and reputed credibility. Presumed credibility refers to automatic belief or trust in an information source. Earned credibility is obtained when frequently positive changes happen. It represents what occurs over time based on users' experiences (O'Grady, 2006). Surface credibility relates to appearance features. Reputed credibility is based on indication through another secondary credible source. These studies build up a more comprehensive understanding of credibility.

In addition, credibility can be described in terms of characteristics of information (Flanagin and Metzger, 2003), features of content (Hong, 2006; Robins and Holmes, 2008), and delivery media (Metzger et al., 2003; Rains and Karmikel, 2009). In such aspects, some studies of credibility have provided insights into different types of information and content, such as political information (Johnson and Kaye, 2009), scholarly information (Liu and Huang, 2005) and online news (Sundar, 1999). Other research focuses on particular computer-based media, such as the Internet and web. For instance, Fogg et al. (2003) conducted a study to examine website credibility. Comments elicited from users address a number of web design factors influencing user' perception of website credibility, such as design look, information design/structure, information focus, company motive, accuracy of information, reputation, etc. Although these studies investigate credibility in different contexts, it seems clear that credibility has been considered as a key factor that users use to make judgments about website quality and value of information. For example, Rains and Karmikel (2009) reported that message characteristics such as statistical data and references, and structural features such as images, third-party endorsements, a physical address and privacy policy statement are importantly associated with website credibility and users always use these elements as credibility cues to judge website quality. Dutta-Bergman (2004) conducted a study to investigate the importance of health information on the Internet. The findings reveal that the completeness and credibility appear as the two critical factors determining quality of information on health websites.

More importantly, credibility has a significant impact on users' perception, attitude and behavior (Rains and Karmikel, 2009). Tormala et al. (2006) carried out a study to explore the effect of source credibility on user attitude and persuasion. They compare

the possibility of generating persuasion between high credibility sources and low credibility sources. The findings indicate that higher source credibility leads to a more favourable attitude and is more persuasive to users than lower source credibility. Moreover, credibility is a fundamental aspect of trust development (Fogg and Tseng, 1999b). Johnson and Kaye (2009) examined trust within an online political information context. The results show that users' trust relies on information they receive from reliable resources. If political information published by a government is perceived as credible, users trust in that government.

2.4.2 Credibility effects on e-government

With respect to e-government, credibility issues have been investigated in terms of e-government services and e-government website design. Regarding e-government services, Carter and Bélanger (2005) investigated the factors influencing usage of e-government services. The findings suggest that service trustworthiness positively affects users' intention to use e-government. Such trustworthiness requires a system indicating that people who work behind e-government have integrity and competence to provide information and services to meet users' needs. To achieve these requirements, the system needs to describe users' role in e-government services in online documentation and present images of people who supply the services on the site. Likewise, a study by Welch and Hinnant (2003) showed that the provision of reliable information on government websites is positively associated with overall perception of e-government and thus it promotes e-government transparency. Furthermore, Park et al. (2009) addressed the role of metadata credibility for describing electronic resources, managing records and documents, discovering information and ensuring their preservation in e-government metadata management services. The study examines credibility of metadata with respect to interoperability (the capability of different systems to exchange data via set of protocol), application profiles (data elements drawn from namespace schemas combined together by implementer and optimized for a particular application), and controlled vocabularies (principle adopted for managing electronic information). The results indicate that in order to achieve credible metadata, government and agencies need to ensure

compliance and effective implementation of universal metadata standards and frameworks.

With respect to e-government websites, Sidi and Junaini (2006) pointed out that credibility of a website is a key element in determining e-government success. As an e-government website is the interface and representative of the e-government, it needs to reflect such credibility in its design. Therefore, they evaluated several e-government websites' credibility in Malaysia. The results show that a number of e-government website features have a strong impact on users' perception of credibility. These include e-government website look, layout design, government information update, accuracy of information, use of animated banner, site information structure and government website reputation. Moreover, Al-Omari and Al-Omari (2006) conducted a study to build trust in e-government. The study particularly addresses the service transaction in terms of security, privacy and authentication in e-government website design. Accordingly, the study suggests that during a service transaction, features such as digital certificate, encryption, user authentication provision and single sign-on convenience need to be provided and presented through the site. Similarly, Sillence et al. (2006) discovered factors influencing website reliability construction, in terms of website interface and content design. Regarding interface design, the factors include site layout, navigation aids, colour usage, adverts presentation, search facilities, site introduction presentation and text density. Regarding content design, the factors are in-depth information, expert information, relevant illustrations, wide variety of topics covered, unbiased information, clear and simple language used, frequently asked questions provision.

2.4.3 Credibility effects on e-government users

E-government credibility has significant effects on users' attitude and behaviour. For example, Welch and Hinnant (2003) explored the interrelation between users' attitude and e-government in terms of information quality, transparency and interactivity. The study indicates that the stronger users perceive that an e-government website provides reliable information, the greater belief in that government. In addition, higher levels of transparency and interactivity generate higher levels of users' satisfaction, which in

turn, contributes to belief in government. Further, Horst et al., (2007) examined the integrity of information management capacities of e-government to users' behaviour. The findings show that users have to decide to adopt the new e-government services by weighting whether information management capacities demonstrate its trustworthiness. This can be achieved by increasing perceived usefulness of e-services, improving users' control of services and reducing perception of service risk. A similar study conducted by Warkentin et al. (2002) investigated the issues that impact on users' acceptance and usage of online government services. That study finds that the lack of service trustworthiness influences users' behaviour, such as engagement intentions, inquiry intentions and sharing personal information.

Furthermore, a number of studies have found that the failure of providing credibility may also cause a serious impact on users' trust of e-government. Bélanger and Carter (2008) examined trust relating to e-government adoption. The results indicate that trustworthy e-government services, especially in aspects of online transaction strongly support the formation of users' trust and reduce users' feeling of insecurity. It appears that with higher trust, users may overcome perception of risk, strengthen their confidence, and enhance their participation. This is also supported by Warkentin et al. (2002), who suggested that improving institution-based trust, characteristic-based trust, process-based trust and psychology-based trust helps users to reduce perceived risk in online tax services and therefore, it encourages users' engagement with e-government.

Bélanger and Carter (2008) found that users' trust can be easily influenced by whether e-government services demonstrated their trustworthiness in aspects of online security and privacy. Such trust can be increased by improving levels of security and designing privacy seals, such as a branded trust mark and a seal of approval logo in online transactions. Similarly, a study by Warkentin et al. (2002) found that users' trust can be created in the way that e-government presents visual certification from the third parties on the website, such as credentials about their reliable services. Al-omari and Al-omari (2006) emphasized that establishment of credibility of e-government can earn user confidence, especially in areas of personal and confidential services, which is helpful to build long-term trust. Tolbert and Mossberger (2003) studied the effects of e-government on users' trust and confidence in government. Their study

identified four e-government features that impact on users' attitude towards e-government usage, which are reliable information, transparency of service, accessibility of e-government and responsiveness of government. Additionally, Carter and Bélanger (2005) investigated user trust and acceptance factors in the utilization of e-government services. The findings indicate that ease of use, usefulness and trustworthiness are significant predictors of users' intention to apply e-government services. Similar results are also found in the study by Warkentin et al. (2002), in which user trust, perceived ease of use and perceived usefulness are key attributes in determining users' intention to engage in e-government.

In summary, evidence from previous studies show that credibility is another important factor in e-government development. In addition, the research findings indicate that e-government credibility significantly influences users' trust and attitude to their use. Without addressing credibility in sufficient detail in e-government development, e-government will remain a challenging target for users' acceptance. Therefore, it is necessary to pay attention to credibility of e-government. More significantly, relevant studies suggest that there is a close interrelation between usability and credibility. The following sections examine the mutual effects of usability and credibility.

2.5 Usability and credibility combination

Usability and credibility have been found to have a close relationship in web-based online systems and a growing number of studies are indicating the mutual interaction among features associated with usability and credibility combinations in relation to website design. For example, users' trust closely relates to credibility (Cassell and Bickmore, 2000; Wang and Emurian, 2005), Flavián et al., (2006) conducted a study to investigate the role played by perceived usability and user trust on website loyalty. The results show that user trust increases when user perceives that the system is usable. More significantly, both perceived usability and user trust can positively influence user satisfaction, and generate great website loyalty. Their study therefore suggests that when developing websites, design features in relation to usability and user trust need to be addressed as a whole. Furthermore, Carter and Bélanger (2005) suggested that by considering features associated with usability and trust together, it

may be helpful to encourage users' intention to use e-government. As such, a research model is developed, which proposes compatibility, relative advantage, image, complexity, ease of use, usefulness and trustworthiness as the different conceptual features to investigate the utilization of e-government services. The findings indicate that only ease of use, trustworthiness and compatibility have the significant influence to users' intention to use an e-government. In addition, trustworthiness can be seen as a fundamental factor of credibility (Hilligoss and Rieh, 2008). Weerakkody and Choudrie (2005) explored current challenges and complexities of e-government in the UK. Among various technical and social challenges analysed, e-government services trustworthiness and website usability have been found to be two important technical challenges for e-government development. In particular, the social challenge, such as users' trust has been significantly influenced by services trustworthiness and website usability. As such, to develop e-government, there is a need to address usability and credibility combination.

Although a number of studies focus on usability of website design, credibility has been also importantly highlighted as a part of usability in these studies. Nielsen (1999, p.1) had examined usability issues in relation to web design. However, within usability, the communication trustworthiness in web design has been also highlighted. For example, "Trust is a long-term proposition that builds slowly as people use a site and get good results.....a single violation of trust can destroy credibility". Thus, to support communication trustworthiness through usability design, four issues are suggested, including design quality, up-front disclosure of all aspects of the user relationship, comprehensive, correct and current content, and connection to the rest of the web. Moreover, Nielsen (2000) later also addressed credibility as a part of usability design of a website. This suggests establishing credibility on every page design. In particular, visual appearance is a major opportunity for establishing credibility. Another study by Tsakonas and Papatheodorou (2008) explored usefulness and usability issues in open access digital libraries. This demonstrates the importance and influence of both issues to users' satisfaction and interaction with the system. However, on closer examination, usability contains ease of use, aesthetics, navigation, terminology, learnability. Usefulness refers to provision of relevant and reliable information. Specifically for e-government, Lowry et al. (2006) investigated website usability. The results identify a strong link between usability and trust, and suggest

that considering the design factors in relation to trust can improve website usability. Furthermore, Garcia et al. (2005) carried out a study to assess the usability of an e-government website. However, in consideration of the mutual influence between usability and trust, the study adds reliability, credibility and security into the usability assessment. As such, among 16 usability heuristics developed, 5 heuristics are associated with trust, which are error preventions, security and privacy, information reliability, service agility, and transparency.

Conversely, although some studies pay attention to credibility in website design, usability features are also importantly indicated. For example, Fogg et al. (2001) identified five types of elements that increase credibility perception of a website. These are real-world feel, ease of use, expertise, trustworthiness, and tailoring. Among them, ease of use is closely related to usability. This is further supported by their later study (Fogg et al., 2003), which evaluated the credibility of websites. In the list of the top 18 issues of website credibility, 7 issues are associated with the usability of the website, which are design look, information design/structure, usefulness of information, accuracy of information, tone of writing, functionality of site and content readability. Moreover, Warkentin et al. (2002) investigated the factors encouraging user adoption of e-government by building trust. The study indicates that except for institution-based trust, characteristic-based trust, process-based trust establishment, website interface ease of use and system usefulness also play key roles in deciding users' intention to accept e-government.

Furthermore, it can be argued that there are some common features that are shared by usability and credibility in website design. Hong (2006) studied the influence of structural and message features on website credibility. Among the website credibility features identified, some of them can be also used as usability features, such as currency of information, navigation tools. These features are also studied by Barnes (2004), who applied information currency and navigation functions as criteria in usability evaluation. Similarly, Yang (2007) investigated credibility of news-related blogs in Taiwan. Some criteria used for credibility perception are also closely related to the usability features, for instance, the degree of provision of fair, unbiased and objective information. These attributes can be also applied to measure usability in aspects of information quality (Garcia et al., 2005). Another research conducted by

Sillence et al. (2006) discovered the factors influencing trust in web-based health advice system. There are a number of credibility features that have been identified. However, among these credibility features, the overlapped features with usability include visual appearance, layout, navigation, language style and tone, updated content. Moreover, Robins and Holmes (2008) focused on aesthetics and credibility in website design. Their results demonstrate that aesthetics design is the first credibility cue. Users judge this credibility quickly because before other cognitive processes take place, preconscious judgements based on visual design elements are already made. However, aesthetics design is also commonly considered as a key aspect of usability (Nielsen, 1994; 2000). High aesthetics treatment of interface directly affects users' perception of the devices' usability (Tractinsky et al., 2000).

In summary, evidence from existing research shows the close interrelation between usability and credibility in website design. Although some studies show that usability belongs to credibility, others indicate that credibility is a part of usability, while others reveal that there are some common features between usability and credibility. It seems clear that usability and credibility have a mutual influence. Therefore, it is necessary to address usability and credibility together when developing future e-government websites.

2.6 Research gaps in relation to usability and credibility in e-government

As indicated before, current research indicate the importance of usability to e-government (Donker-Kuijer et al., 2010; Gant and Gant, 2002; Kossak et al., 2001; Kumar et al., 2007; Magoutas and Mentzas, 2010; Magoutas et al., 2010). Although some studies consider usability issues in relation to e-government service provision (Baker, 2009; Henriksson et al., 2007; Kossak et al., 2001), some studies explain the role of usability in aspects of e-government development (Magoutas et al., 2010; Schedler and Summermatter, 2007), there is limited attention focusing on usability in e-government website design. As addressed, an e-government website is a key priority for governments when they develop their e-government systems (Barnes, 2004; Gant and Gant, 2002; Garcia et al., 2005; Tolbert and Mossberger, 2003; Wang et al., 2005). Even those few studies that investigated usability in relation to e-government website

(Donker-Kuijer, 2010; Gant and Gant, 2002) still lack a thorough and in-depth assessment of usability of e-government website. It can be argued that without addressing usability at a detailed level in e-government website design, e-government still retains the challenging target of how best to interact with users. Therefore, this implies that usability should have been examined in detail in e-government website design. Making up this gap may provide results which help designers and developers gain a better understanding of usability at the detailed level in relation to e-government and its website design.

The findings from previous studies (Al-omari and Al-omari, 2006; Bélanger and Carter, 2008; Tolbert and Mossberger, 2003; Warkentin et al., 2002; Welch and Hinnant, 2003) indicate that users' trust is an important relationship between users and government. Some studies examine the provision of trustworthy e-government services to improve trust (Bélanger and Carter, 2008; Carter and Bélanger, 2005; Horst et al., 2007; Warkentin et al., 2002). Some studies investigate how publishing reliable information on e-government websites to promote greater users' trust (Tolbert and Mossberger, 2003; Welch and Hinnant, 2003). However, since all e-government information and services are now delivered through e-government websites to users (Layne and Lee, 2001; Yang and Paul, 2005), users' trust can be influenced by whether e-government websites sufficiently demonstrates their credibility (Huang et al., 2009). In this respect, e-government website credibility becomes a major factor influencing users' trust of government (Bélanger and Carter, 2008) and determining e-government success (Sidi and Junaini, 2006). However, very little research has been paid attention to examine credibility of e-government websites. Examining this gap may support designers and developers to obtain a deeper understanding of credibility concepts in e-government context, especially in relation to e-government website design.

Research findings have shown that there is a close interrelation among features associated with usability and credibility in web-based online systems (Fogg et al., 2001; Nielsen, 2000; Robins and Holmes, 2007; Tsakonas and Papatheodorou, 2008; Weerakkody and Choudrie, 2005), and suggested that usability and credibility should be considered together when developing websites (Carter and Bélanger, 2005; Fogg et al., 2003; Garcia et al., 2005; Nielsen, 1999), which may improve website quality and

generate greater users' participation (Gil-Garcia, 2006; Howard, 2001; Kolsaker, 2006). However, there is no specific study that investigates usability and credibility combination and their interrelationship, especially in e-government. Examining this gap can provide a much better understanding of relationship between usability and credibility in e-government.

This research therefore attempts to evaluate usability and credibility of current e-government websites. This aim leads the study to address the following research questions:

RQ1: What are the existing usability problems in current e-government websites?

RQ2: What are the existing credibility problems in current e-government websites?

In addition, in order to carry out a thorough usability and credibility research, based on the usability and credibility problems identified, the study provides the proposed design solutions and examines the effects of these proposed design solutions on each target e-government website. The following questions frame this part of research:

RQ3: What are the effects of the proposed usability design solutions on the usability problems on each target e-government website?

RQ4: What are the effects of the proposed credibility design solutions on the credibility problems on each target e-government website?

RQ5: What are the effects of the proposed design solutions on users' interaction with each target e-government website?

2.7 Summary and conclusion

In this chapter, a review of relevant studies has been undertaken. The review and analysis of existing literature, and empirical findings have identified the research scope and demonstrated the importance of usability and credibility to e-government.

Evidence from literature suggests that usability and credibility are two important factors in determining e-government success, which need to be reflected to users through e-government websites. Furthermore, there is an interrelation between usability and credibility, which need to be considered together and addressed on e-government websites. Without addressing usability and credibility in sufficient detail to inform e-government website design, e-government will not be fully accepted by a wider range of users. In this aspect, there is a need to investigate usability and credibility of e-government.

This study conducts the usability and credibility evaluation of current e-governments, focusing on specific e-government websites in the UK. By conducting such an evaluation, it can provide deeper insight into e-government usability and credibility, identifying existing problems and offering specific solutions for further usability and credibility improvement. Chapter 3 will describe relevant theoretical background and identify the evaluation methods used in this study.

CHAPTER 3

THEORETICAL BACKGROUND

3.1 Introduction

The previous chapter has reviewed existing literature to indicate the importance of usability and credibility to e-government websites. Relevant studies have suggested that there is a need to conduct usability and credibility evaluation of current e-government websites in order to develop more user-centred e-government. Chapter 3 identifies the evaluation methods used in the study and describes relevant theoretical background of the usability and credibility inspection. More specifically, among the various evaluation methods, the primary method adopted in this study is heuristic evaluation, which is based on users' perception to implement a thorough and in-depth evaluation of e-government websites. In addition, users' performance is measured in order to reveal the level of users' interaction with the target e-government websites. By doing so, it can provide a more comprehensive evaluation, which not only provides insight into e-government websites usability and credibility, but also indicates users' task performance with the e-government websites evaluated. To conduct heuristic evaluation in the study, Nielsen's set of usability heuristics and Fogg's set of credibility guidelines are used as a starting point, as their usefulness has already been validated in a number of studies (Baker et al., 2001; Edwards et al., 2008; Huang et al., 2009; Liu and Huang, 2005; Sidi and Junaini, 2006; Sutcliffe and Gault, 2004). However, these heuristics and guidelines were used for general website usability and credibility purposes. In order to meet the specific requirements of e-government, additional usability heuristics and credibility guidelines have been added. Furthermore, to conduct performance measurement, a set of performance criteria have been also identified to measure users' task performance with the specific e-government websites.

Thus, the chapter starts with the discussion and identification of the evaluation methods used in this study (section 3.2). This is followed by describing and

expanding Nielsen' set of usability heuristics and Fogg's set of credibility guidelines in sections 3.3 and 3.4, respectively. Finally, a brief summary and conclusion is provided at the end of the chapter (section 3.5).

3.2 Usability and credibility evaluation methods

As indicated in the previous chapter (see section 2.3 and 2.4), usability and credibility need to be importantly addressed on e-government websites. Therefore, usability and credibility evaluation of web-based e-government becomes a necessary activity, which can provide detailed insight into e-government usability and credibility, identifying existing usability and credibility problems and offering specific solutions for further usability and credibility improvement. However, e-government is used by diverse users who have heterogeneous backgrounds, in terms of knowledge, skills and experience, which lead to various requirements of usability and credibility from e-government. Such different users' requirements increase the challenge of usability and credibility identification by designers when developing more usable and credible e-government. In response to this challenge, user involvement reveals the user point of view (Dos-Santos and Reinhard, 2007; Schedler and Summermatter, 2007; Thompson et al., 2003), which can help understand users and their usability and credibility needs. Furthermore, it can directly identify what e-government features can cause users to have most concerns about usability and credibility. This is also in line with user centred design and evaluation in HCI, where one of the major tasks is to understand user' needs (Følstad et al., 2004; Kossak, et al., 2001). Thus, there needs to be more attention directed towards users' evaluation of usability and credibility of e-government, because such evaluation can provide concrete prescriptions for developing more user-centred e-governments that may support the user achieving the desired services outcome and so generate greater users' participation.

In usability inspection, the major approaches include heuristic evaluation, cognitive walkthrough and user testing (Chen and Macredie, 2005; Matera et al., 2002; Redish et al., 2002; Tanaka et al., 2005). Heuristic evaluation asks evaluators to examine the user interface features against a set of predefined criteria or guidelines (Wild and Macredie, 2000). Cognitive walkthrough is based on cognitive theory (Rieman et al.,

1995), which requires potential users to think aloud to explain system features while working on specific tasks and examining its ease of learning (Haak et al., 2003). User testing assesses user behaviour by observing how the system is actually used by some representatives of the wider user group (Wood et al., 2003).

Regarding credibility evaluation, many methods, focusing on users' perspective have been used in previous research. For example, Liu and Huang (2005) applied a users' feedback method to assess credibility of scholarly information on the web. Sidi and Junaini (2006) conducted a guideline-based survey to examine the credibility of e-government websites. In addition, Hilligoss and Rieh (2008) suggested that credibility assessment is seen as an iterative process. They combined task behaviors observation and the interview approaches to examine credibility.

3.2.1 Heuristic evaluation

Among these various evaluation methods, heuristic evaluation is a quicker, easier and more effective approach for identifying potential problems (Allen et al., 2006; Baker et al., 2001) and has been broadly used in many studies (Edwards et al., 2008; Sutcliffe and Gault, 2004; Yehuda and McGinn, 2007). The results of the evaluation are helpful to improve the interaction design and a number of studies show that the design feedback provided by the heuristic evaluation is valid and useful (Baker et al., 2001; Hvannberg et al., 2007; Yehuda and McGinn, 2007; Zabed Ahmed et al., 2006). Heuristic evaluation involves evaluators discovering the interface problems based on a set of design principles, guidelines or heuristics (Sutcliffe and Gault, 2004). The popularity of heuristic evaluation is reflected by its cost-effectiveness. In detail, heuristic evaluation can be effectively employed by both experts and novices although it is sometimes called expert inspection (Muller et al., 1998). While it can be conducted by a single inspector, its effectiveness can be improved by increasing the number of evaluators (Nielsen, 1993).

Furthermore, heuristic evaluation can identify a high proportion of problems. For example, Fu et al. (2002) used both heuristic evaluation and user testing approaches to identify design problems in web-based software interfaces. Of 39 total problems

found, heuristic evaluation identified 34 problems, whereas user testing only detected 21 problems. This strength of heuristic evaluation is also reflected by Jeffries et al. (1991), who compared four different evaluation techniques to discover the user interface problems of a software product. These evaluation techniques include heuristic evaluation, cognitive walkthrough, software guidelines and user testing. The results show that heuristic evaluation found the most problems among the four evaluation techniques.

In addition, heuristic evaluation is flexible and can be used for in-depth inspection. Garcia et al. (2005) applied heuristic evaluation for assessing Brazilian government websites. In order to ensure that heuristics can discover entire e-government website features and pay enough attention to the detailed design elements in the evaluation, they extended the set of heuristics to meet the specific needs of e-government websites. Furthermore, a number of detailed sub-items were also developed, based on each extension heuristic. In such a way, the results indicate that a range of serious problems were raised from all 16 heuristics. In particular, heuristics, such as security and privacy; efficiency of use; information precision; visibility of system; interoperability; transparency enable a more thorough and in-depth inspection. For example, specific design issues, such as the lack of digital certification, the absence of a virtual keyboard for password input for security and privacy, have been clearly detected. Additionally, Allen et al. (2006) conducted heuristic evaluation to discover the problems in a website interface design. The evaluators made a total of 108 comments on the design. These problems were sorted by four levels of severity, in which 22% of them were rated as level 1 problems, 50% belonged to level 2 severity problems, 22% were in level 3 seriousness and 6% of features were considered as level 4 severity problems.

Overall, these studies have proved the applicability and usefulness of heuristic evaluation for detecting potential problems. Accordingly, this study applies such an approach to evaluate usability and credibility of the target e-government websites. However, as indicated by Allen et al., (2006), the heuristic evaluation method requires users to detect problems that may have a profound effect on users' ability to interact with the system. As such, there is also a need to measure users' interaction with the target e-government websites.

3.2.2 Performance measurement

Performance measurement is another evaluation method used in this study. Its usefulness and applicability have been validated in several studies (Han et al., 2001; Matera et al., 2002; Sonderegger and Sauer, 2010). In general, it requires users to perform a series of practical tasks using the system. Whilst they complete the tasks, their task performance is measured by a number of performance criteria. In this way, it can clearly indicate the level of users' interaction when they implement a set of tasks with the system. For example, Park and Lim (1999) conducted performance measurement to assess how capable the users are when using the system. The attributes, such as effectiveness, efficiency and satisfaction have been quantified through a number of performance criteria, such as error rate, number of references to help and task completion time. Based on the observation of these performance criteria, the detailed level of users' interaction with the system has been clearly indicated.

Furthermore, a growing number of studies have indicated that user performance measurement gives more attention to users' perspective (Chattratchart and Brodie, 2004; Fu et al., 2002; Lee and Koubek, 2010; Sauer and Sonderegger, 2009; Zayed Ahmed et al., 2006), which is beneficial for understanding users and their needs. Han et al., (2001) carried out performance measurement in usability evaluation. This performance measurement addresses users' perception and cognition, learning and memorization, control and action. The findings identify a number of elements, which either cause the users' most concern, or have significant influence on users' performance. Such elements can help designers capture users' requirements for product usability.

Moreover, performance measurement is a flexible approach that can be used with other evaluation methods (Matera et al., 2002; Park and Lim, 1999; Sonderegger and Sauer, 2010; Tanaka, et al., 2005; Zayed Ahmed et al., 2006). Matera et al. (2002) conducted a study, which combines usability inspection and performance measurement. The results show that these two methods are complementary, and can be effectively applied to obtain a reliable evaluation process. Such mixed evaluation

ensures that users are better focused, and users' resources are better optimised, with the overall consequence of making the evaluation less expensive. More importantly, performance measurement can provide more comprehensive evaluation when combine with heuristic evaluation. Zabed Ahmed et al., (2006) carried out an information retrieval interface evaluation, using both heuristic evaluation and performance measurement methods. The results identify that by using both methods, it can not only find the interface problems, but also reveal users' task performance. More significantly, users' performance indicates how the functionality of the interface supports users' tasks, which can reflect the results obtained from the heuristic evaluation. Therefore, the authors conclude that combining heuristic evaluation with performance measurement can generate richer evaluation results.

The other advantage of performance measurement is that it is a straightforward method to assess users' interaction with systems. For example, Sonderegger and Sauer (2010) measured users' performance to reveal users' interaction. Users' performance can be easily and directly obtained by observing a set of performance criteria. Research into performance measurement identifies that performance criteria that have been commonly used to measure users' performance include successful completion of tasks (Bevan, 1995; Haak et al., 2003; Park and Lim, 1999; Sauer and Sonderegger, 2009; Tanaka et al., 2005; Zabed Ahmed et al., 2006), number of steps in tasks completion (Park and Lim, 1999; Sauer and Sonderegger, 2009), number of online helps required (Han, 2001; Park and Lim, 1999; Tanaka et al., 2005) and the time to finish tasks (Benbunan-Fich, 2001; Bevan, 1995; Haak et al., 2003; Han et al., 2001; Lee and Koubek, 2010; Zabed Ahmed et al., 2006). These criteria can be easily, simply and quickly measured through observation, which can gain precise performance results. Additionally, they are helpful to indicate the level of users' interaction with system. Therefore, these performance criteria are selected as the measurable criteria used in performance measurement in this study.

3.3 Nielsen's usability heuristics

Nielsen's usability heuristics (see Table 3.1) have been popularly used for usability inspection and their applicability, validation and usefulness have been proved in a

number of studies (Allen et al., 2006; Baker et al., 2001; Chen and Macredie, 2005; Edwards et al., 2008; Sutcliffe and Gault, 2004; Tanaka et al., 2005). In particular, these heuristics can effectively discover usability issues in relation to website design (Allen et al., 2006; Nielsen, 2000) and cover a wide range of interface design features (Baker et al., 2001; Edwards et al., 2008; Garcia et al., 2005; Zayed Ahmed et al., 2006). Accordingly, this study uses these heuristics as a starting point in the heuristic evaluation to assess the target e-government websites usability.

Table 3.1 Nielsen's usability heuristics (Nielsen, 1994)

Usability Heuristics	Explanations
H1. Visibility of system status	The site should keep users informed about what is going on through appropriate feedback within a reasonable time.
H2. Match between system and the real world	The site should use the user's language, follow real-world conventions, make information appeared in a natural and logical order.
H3. User control and freedom	The site should make undo and redo functions available during interaction and support users to leave the site at all times.
H4. Consistency and standards	The site should keep the same design features and follow platform conventions through the site.
H5. Error prevention	The site should support users to overcome errors and prevent the same problem occurrence.
H6. Recognition rather than recall	The site should make objects, actions and options easy to remember. In addition, instruments on the site should be visible and easily retrievable.
H7. Flexibility and efficiency of use	The site should consider the usage for both novice users and experienced users. Furthermore, it allows users to tailor frequent actions.
H8. Aesthetic and minimalist design	Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.
H9. Help user recognize, diagnose and recover from errors	The site should indicate error messages. Error messages should precisely indicate the problem and constructively suggest a solution.
H10. Help and documentation	The site should provide help and documentation that can be easy to search, focus on the users' tasks, list concrete steps to support users.

However, these heuristics were developed 15 years ago and used for general website usability evaluation purposes. In particular, Nielsen's set of heuristics are not context specific (Allen et al., 2006; Sutcliffe and Gault, 2004; Yehuda and McGinn, 2007), which may provide incomplete usability evaluation outcomes when they are applied to a particular context. Without analysing usability within the specific application domain, usability evaluation may miss out on important information, and therefore the evaluation goals remain the challenging target.

3.3.1 Extension of usability heuristics

In order to meet the specific requirements of e-government, it is necessary to extend Nielsen's existing heuristics. Evidence from previous studies indicates that e-government is used by a wide range of people, while interoperability is importantly required in terms of information and service exchange (Garcia et al., 2005). For example ensuring news is kept current between e-government and government. Similarly, Gottschalk (2009) stated that improved interoperability in e-government is of critical importance to make e-government successful. The maturity levels of interoperability in e-government not only determine the internal business process and transaction, but also influence users to achieve their desirable services outcomes. This is also supported by Dos-Santos and Reinhard (2007), who addressed the issue that interoperability is the unique feature in e-government development because it enables users to correctly receive, transfer and use data from e-government services. More importantly, it may lead to an increase in the quality of public services and in users' interaction. Furthermore, Gottschalk and Solli-Sæther (2008) also pointed out the significance of e-government interoperability in terms of work process, knowledge sharing, value creation and strategy alignment. Without developing interoperability, e-government remains facing the challenging target of becoming usable.

In addition, since e-government is used by diverse users who have heterogeneous skills, e-government should therefore support users with different skills to access services in a simple way. As indicated by Thompson et al., (2003), the key usability is not only how well an e-government website works, but also the degree to which an e-government website meets user needs and skills. Evangelidis et al., (2002) analysed the risk and success factors for e-government development and identified that users' skills represent the human risk factor influencing e-government progress. Hence, users' skill is becoming a necessary consideration when developing e-government. Another study conducted by Følstad et al. (2004) demonstrated that a truly overwhelming range of users may be involved in e-government services, with a variety of skills. In order to encourage users' participation, e-government is particularly required to increase usability that can support users' skills to complete their tasks. Furthermore, Kossak et al. (2001) indicated that the e-government website design principles should take the support of users' skills into account. Such users'

skills support can be achieved by placing users in control and reducing users' memory load when interacting with e-government website.

Furthermore, the users' interaction with e-government is another important part, which enhances the quality of users' experience. During users' interaction with online services, e-government should present government organisation respect to users at all times (Reddick, 2005; Montagna, 2005). This respectful interaction can be reflected in an e-government website, indicating the professional role (Kolsaker and Lee-Kelley, 2006) such as the explanation of service provision duties and data protection terms, verifying personal identity (Bélanger and Carter, 2008) or confirming users' intention (Anthopoulos et al., 2006; Yang et al., 2005). In addition, the users' skills support and respectful interaction provision are reflected by Muller et al. (1998), who supported adding these heuristics to the existing Nielsen heuristics. As discussed by Muller et al., the 'classic' Nielsen's heuristics are considered as "product-oriented". In terms of evaluation, the "product-oriented" paradigm is concerned with the system itself, which lacks users' aspect of systems. To overcome these shortages, a "process-oriented" perspective can be used to address systems to users and users' needs. In this aspect, the users' skills support and provision of respectful interaction belong to the "process-oriented" category, which addresses the systems that support, extend and enhance users' skills, and treat users with respect. Therefore, based on the usability requirements in the e-government context, the existing heuristics are extended by adding three heuristics: interoperability, support and extend users' skills, and pleasurable and respectful interaction with users (see Table 3.2).

Table 3.2 Extended usability heuristics

Extended Heuristics	Explanations
H11. Interoperability	The site should make all service parts, design elements, the site functions work as a whole to support user task completion.
H12. Support and extend users' skills	The site should support, extend and improve users' current skills and knowledge when they perform the tasks.
H13. Pleasurable and respectful interaction with users	The site should present a pleasant design and treat users with respect. User's interaction with the site should be enhanced by the quality of the site.

3.4 Fogg's credibility guidelines

Fogg's set of credibility guidelines (see Table 3.3) have been widely used for credibility evaluation and a growing number of studies have examined its applicability and usefulness (Liu and Huang, 2005; Sidi and Junini, 2006). These guidelines can describe the common properties of a credible website. In credibility evaluation, they can help evaluators focus their attention on the specific aspects of website design that make credibility problems identification easier (Collins, 2006; Fogg et al., 2003; O'Grady, 2006; Rains and Karmikel, 2009). As such, this study applies these guidelines as a starting point in heuristic evaluation to assess e-government website credibility.

Table 3.3 Fogg's credibility guidelines (Fogg, 2002)

Credibility Guidelines	Explanations
G1. Site looks professional	The site should pay attention to layout, typography, images and consistency issues and visual design should match the site's purpose.
G2. Easy to verify the information accuracy	The site should link the evidence to show the validation and confidence of the materials and information presented.
G3. Show a real organization behind site	The site should prove that it is a legitimate organization, indicating there are real people working behind the site.
G4. Highlight the expertise in your organization and in the content and services provided	The site should indicate an expert team and provide authority services during user interaction.
G5. Show the honest and trustworthy people behind site	The site needs to show the real people behind the site, who convey their trustworthiness through images and text.
G6. Make it easy to contact you	The site should provide clear contact details, using multiple contact information at any time.
G7. Make site easy to use and useful	The site should support users to easily complete their tasks and allow them to conduct the tasks in their own way.
G8. Update site's content often	The site should update and review its content regularly.
G9. Use restraint with any promotional content	The site should avoid having ads, or clearly distinguish the sponsored information from the main content.
G10. Avoid errors of all types	The site should prevent a problem from occurring in the first place, even a small error, such as words misspelled and broken links.

However, the most widely used set of Fogg's credibility guidelines adopted for credibility evaluation are those developed in 2002, which was 8 years ago (see Table 3.3). In addition, these guidelines were used for general website credibility evaluation purposes. In order to fit to the specific needs of e-government websites, it is important to derive additional credibility guidelines and extend Fogg's existing guidelines.

3.4.1 Extension of credibility guidelines

Evidence from relevant literature of e-government studies indicates that e-government is used for public administration. E-government transparency is importantly required in aspects of government operation processes and the provision of in-depth government information, such as public expenditure (Welch and Hinnant, 2003). This is also supported by De (2006), who indicated that e-government transparency is an objective for almost all e-government projects. In particular, transparency needs to be increased in providing services to users, such as offering the progress request procedure, where users know the status of their requests from the queue detail. Similar results are revealed by Dos-Santos and Reinhard (2007), who emphasised that among the various purposes of e-government, one major purpose is to transform transparency in the offer of service and provision of information to users and organisations. Moreover, Tolbert and Mossberger (2003) pointed out the urgent demand of transparency in building e-government. Such transparency significantly influences users' confidence and trust in government. To achieve transparency, an e-government website needs to post detailed information, such as policies, laws, meeting schedules and contact information, and make information searches easier for users.

In addition, since a variety of information and services have become available on e-government websites, e-government websites need to deliver their services with flexible mechanisms that can support users developing their own ways to achieve the desired outcomes (Gant and Gant, 2002). This is echoed by Wang et al. (2005), who indicated that the current challenge in delivering e-government services is to design e-government website to make it easier and more flexible for users to find desired information. Furthermore, Kumar et al. (2007) addressed the role of service quality in e-government success. They emphasise that the services quality is largely dependent on understanding the needs of users and tailoring services to cater for those needs. In such a condition, the services provided by e-government should be agile for usage when users interact with the e-government websites. As such, service agility is becoming an important characteristic of e-government.

Furthermore, all information and services are delivered and transacted via the Internet. Security and privacy are the key element in protecting such services in insecure areas (Bélanger and Carter, 2008). Meneklis et al. (2005) analysed web services security within an e-government architecture. The findings suggest that a secure service is required throughout all aspects of e-government. In addition, Al-Omari and Al-Omari (2006) indicated that information security issues, such as user authentication and encryption, and privacy issues, such as confidentiality and online interaction validity, are major concerns in e-government development. To develop an e-government that can be accepted and used by a range of users, these issues must be prioritised. Security and privacy issues are also addressed by Garcia et al. (2005), who identified that e-government websites should be protected against hackers because users rely on information on the site. Moreover, users' information should be protected when they send it to these e-government websites. Furthermore, Thompson et al. (2003) indicated that information security and privacy must be protected at all levels of e-government websites for users. These concerns reflect the particular requirements of e-government websites and are closely related to user trust (Gant and Gant, 2002; Warkentin et al., 2002; Welch and Hinnant, 2003). Therefore, based on these issues, three new guidelines for transparency, service agility and privacy and security are added to Fogg's ten credibility guidelines for this study (see Table 3.4).

Table 3.4 Extended credibility guidelines

Extended Guidelines	Explanations
G11. Transparency	The site should keep users informed about a clear governmental operations and make government budgeting and spending information available.
G12. Service agility	The site should provide flexible services to fit different user paths.
G13. Privacy and security	The site should help users protect personal information and secure their private services.

3.5 Summary and conclusion

This chapter indicates that there is a need to evaluate usability and credibility of current e-government websites in order to improve users' interaction and acceptance of e-government. However, since e-government is used by diverse users with heterogeneous backgrounds, such as knowledge, skills and experience, in order to understand users' requirements, any usability and credibility evaluation of e-

government websites needs to address the users' perspective. This study therefore focuses attention mainly towards the users' evaluation of usability and credibility of current e-governments, because such evaluation can provide concrete prescriptions for developing more user-centred e-governments that may support the user achieving the desired services outcome and so generate greater users' participation.

Among the possible evaluation approaches, the primary method used in this study is heuristic evaluation, which involves users implementing a thorough and in-depth evaluation. In addition, to obtain a more comprehensive evaluation, performance measurement is selected as the appropriate evaluation method for assessing users' task performance with the target e-government websites. In this way, it can not only offer deeper insight into e-government website usability and credibility based on users' perceptions, but also indicate the level of users' interaction with these e-government websites.

To conduct the usability and credibility evaluation, the study applies Nielsen's usability heuristics and Fogg's credibility guidelines as a starting point. However, in order to fit in with the particular needs of e-government, the existing Nielsen's usability heuristics are extended by adding three heuristics: interoperability, support and extend users' skills, and pleasurable and respectful interaction with users. Similarly, three new credibility guidelines for transparency, service agility and privacy and security are added to Fogg's ten credibility guidelines. Furthermore, to measure the users' performance on a set of tasks with the e-government websites, a set of performance criteria are identified in this study. These performance criteria include number of successful tasks completion, number of steps to complete tasks, number of online helps required and total time to finish tasks.

Having identified the evaluation methods and provided relevant theoretical background to the usability and credibility evaluation, the next chapter will present the research methodology employed for the study. This includes research strategy, research approaches, research techniques, research design and the data analysis techniques to be used.

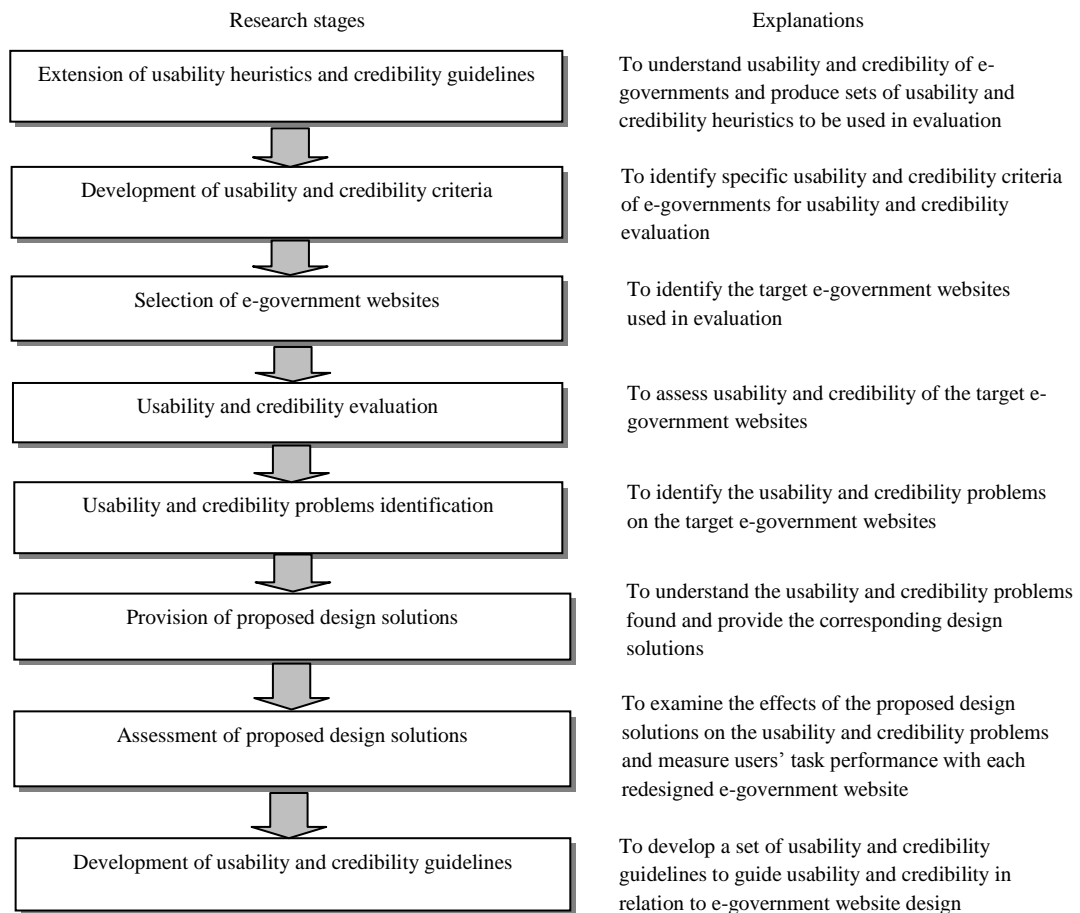
CHAPTER 4

METHODOLOGY

4.1 Introduction

Having indicated the theoretical background of the usability and credibility evaluation of e-government websites in the previous chapter, Chapter 4 describes the research methodology within which the research process will be conducted. The research strategy used in this study is based on a quasi-experimental study. The purposes of the experiments are: 1) to evaluate the usability and credibility of current e-government websites, identifying the existing usability and credibility problems; 2) to assess the effects of the proposed design solutions on the usability and credibility problems detected in each target e-government website. As such, two experiments are conducted in this study. Both quantitative and qualitative data are collected through the questionnaire and observation research techniques to answer the research questions set out in section 1.2. Figure 4.1 outlines the research stages through two experiments and the detailed research design used in the experiments is explained in the following sections.

Figure 4.1 Research stages diagram



Therefore, this chapter begins with the identification and justification of the research methodology in terms of the research strategy, approaches and techniques (section 4.2). It is followed by describing the research instruments used for the experimental study (section 4.3), and the research design of the two experiments (section 4.4). Then, section 4.5 presents and justifies the data analysis techniques employed for the study. Finally, a brief summary and conclusion is provided at the end of the chapter (section 4.6).

4.2 Research strategy, approach and techniques

As indicated before (see section 1.2), the aim of this research is to evaluate the usability and credibility of current e-government websites, identifying the existing usability and credibility problems. Based on these identified usability and credibility

problems, design solutions are proposed and examined for each target e-government website. The methodology used in this study is a quasi-experimental study, which combines quantitative and qualitative approaches to collect data through the questionnaire and observation research techniques. This section provides the detailed justification of the research strategy, approaches and techniques employed in this study.

4.2.1 Research strategy: experimental study

According to Denscombe (2003), there are four common research strategies to be employed in practice: case study; historical research; survey research and experimental study. Case study generally uses detailed contextual analysis of a single individual, group and event to explore underlying principles (Yin, 2009). Historical research refers to the process of systematically examining past and current events to discern the meaning of events (Leedy, 1997). Survey research is regarded as a means of determining and explaining practical phenomena (Rates, 2004), and experiment is a study in which conditions are under the control of researchers to investigate causal relationship (Boudreau et al., 2001). To choose the appropriate research strategy, it largely depends upon the research questions being investigated. Leedy (1997, p.229) pointed out that “the experiment study attempts to control the entire research situation, expect for certain input variables that become suspects as the cause of whatever change has been taken place within the investigation design”. In other words, the experimental study applies a research activity under controlled conditions and environments to explain “cause and effect” relationships (Walliman, 2001). In particular, in the experimental study, one situation can be altered by bringing an extraneous variable into it. Each situation can be re-evaluated after the intervening alteration. The changes in re-evaluation can be shown to have been caused by the extraneous variable. This feature is particularly suitable for the purpose of this study, because this research attempts to evaluate the usability and credibility of the e-government websites, detecting the usability and credibility problems. Based on the problems found, it provides relevant proposed design solutions. After that, it aims to re-evaluate the effects of the proposed design solutions on the usability and credibility problems identified in the target e-government websites. Such effects can be

measured within the rigorous control of conditions to indicate whether the proposed design solutions can cause the problem to be solved. Therefore, the experimental study is considered as the most appropriate research strategy for the purpose of this study.

In this context, this research involves two linked experiments. Experiment 1 evaluates the usability and credibility of current e-government websites, identifying the usability and credibility problems. According to the problems found, design solutions are proposed. Experiment 2 assesses the proposed design solutions regarding the usability and credibility problems identified on each target e-government website. The detailed experiment design is presented in section 4.4.

4.2.2 Research approach: quantitative and qualitative approaches

Traditionally, research approaches can be differentiated as either quantitative or qualitative (Brannen, 1992). The quantitative approach generally examines relationships among measurable variables with the purpose of explaining, predicting and controlling the phenomena (Leedy, 1997). In contrast, the qualitative approach usually attempts to investigate the nature of the phenomena with the purpose of describing and understanding it (Leedy and Ormrod, 2001).

When comparing the characteristics of quantitative and qualitative approaches, the former always allows researchers to objectively measure the study instead of their “subjects” in order to have unbiased and universal results (Tashakkori and Teddlie, 1998). Whereas, the latter is usually employed when researchers want to have exploration of the importance of the subjective and experiential “lifeworld” of human beings (Burns, 2000).

Furthermore, the quantitative approach provides a deductive test for assumptions. It isolates the variables, collects numerical data and applies statistical procedures to analyse the results (Leedy and Ormrod, 2001). Such results are beneficial for researchers to develop knowledge, such as cause and effect thinking, reduction to specific variables, use of measurement and observation, and testing of theories

(Creswell, 2009). Conversely, the qualitative approach generally assumes a reality, which is socially constructed and complex (Glesne and Peshkin, 1992). This type of study cannot easily be divided into discrete and measurable variables (Leedy, 1997). It collects an extensive amount of verbal data to describe and interpret the situation that researchers have investigated. Such results can lead to discovering, building or developing theory, as opposed to testing it (Leedy and Ormrod, 2001).

Although distinctions can be drawn between qualitative and quantitative approaches to scientific investigation, it can be argued that these two approaches can be combined together in a single study. In an earlier study, Bryman (1988) suggested that quantitative and qualitative approaches are valid and useful to achieve “breadth” and “depth” purposes in a project and can be mixed in the same investigation. This is also supported by Hazzan et al. (2006), who conducted a study into computer science education. This pointed out that the quantitative approach is used to confirm hypotheses that are formulated in the research, but it still faces the challenge of describing and analysing the participants' thought processes. The authors emphasize that the quantitative approach alone provides a limited viewpoint for research. There is a need to gain deep insight into the research. Employing the qualitative approach can overcome this shortage, which enables researchers to deepen and expand their findings. On the other side, Creswell (2009) argued that there are also some limitations to the qualitative approach. For example, it is subjective and time-consuming. The samples selected are always small and not representative. To overcome these limitations, Creswell suggested combining quantitative and qualitative approaches in future studies.

This is also supported by Leedy and Ormrod (2001), who addressed the issue of quantitative and qualitative approaches, showing how they represent complementary components in the research process. For example, a quantitative study is always used to confirm or reject the hypotheses tested at the end of the study. However, a qualitative study is more likely to focus on tentative answers about what is studied. These tentative answers can compose of the future study designed to test the proposed hypotheses.

In information system evaluation studies, the mixed approach is also widely employed. Liu and Huang (2005) adopted both quantitative and qualitative approaches to evaluate credibility of scholarly information on the web. The results showed that by using both approaches, it can obtain a more comprehensive credibility evaluation, which not only reveals the current situation of credibility of scholarly information on the web, but also provides in-depth assessment of the effects of culture differences on scholarly information credibility. Another study conducted by Jaeger (2006) assessed accessibility of federal e-government websites. Both quantitative and qualitative approaches are applied to identify problems. Although a quantitative approach in automated testing did not find any accessibility errors, a qualitative approach in expert and user testing detected a number of the problems, which enriched the research findings. As such, the author addressed the importance of applying the mixed research method in a single study. Additionally, Chen and Macredie (2005) also carried out a web-based evaluation study using the mixed approach. The findings showed that there are a number of usability problems that have been found by both quantitative and qualitative approaches. In particular, the quantitative approach has missed some problems that are identified by the qualitative approach. Therefore, previous research suggests that the mixed quantitative and qualitative approach is an effective way to ensure that the study is investigated thoroughly.

The purpose of this research is to evaluate the usability and credibility of current e-government websites. This evaluation is based on users' perception and performance. In order to obtain a more comprehensive evaluation, which not only provides insight into e-government websites usability and credibility based on users' perception, but also evaluates users' task performance within these e-government websites, the mixed approach, with an emphasis on the quantitative approach, is considered as the most appropriate for this research.

4.2.3 Research techniques: questionnaire and observation

To collect data, two research techniques are employed in this study: questionnaire and observation. Both research techniques are used to approach the research questions, but from different research perspectives. More specifically, questionnaires aim to capture

users' perception and opinions to assess usability and credibility of the e-government websites. Observation is used to obtain the level of users' interaction when they perform a set of practical tasks within the e-government websites evaluated. The following sub-sections present detailed descriptions of these research techniques.

Questionnaire

Questionnaire is a very flexible and useful method to collect data in scientific investigations (Zaharias and Poylymenakou, 2009). It is widely used to identify respondents' opinions, judgments and preferences. Using a questionnaire can drive the participants directly to the research topics, which enable the participants to clearly see the focuses. In addition, using a questionnaire can ensure that the same questions are delivered to each participant and their responses can be obtained quickly. In particular, with an anonymous response style, it encourages respondents to offer their truthful reply, especially when the participants are talking about controversial issues (Walliman, 2001). Moreover, questionnaire is also an economic method (Root and Draper, 1983), which is cheaper to manage and takes less time to conduct than other methods (Zaharias and Poylymenakou, 2009). Thus, the questionnaire is considered to be an appropriate method to gather data related to users' perception of usability and credibility of the e-government websites in this study. The purpose of applying the questionnaire is to obtain users' assessment of usability and credibility towards the target e-government websites. Both quantitative and qualitative data are collected through the closed and open-ended questions of the questionnaire in the study. The detailed design of the questionnaire is described in the research instruments (section 4.3.3).

Observation

Observation is a technique which records what people actual do (Gill and Johnson, 1991). Generally, it is classified as direct observation (e.g. writing notes) or indirect observation (e.g. audiotapes or videotapes recording). Observation can be recorded in detail information to capture particular aspects of people behaviour. This behaviour can be quantified through a variety ways, for example counting each occurrence of the behaviour to indicate its frequency, or rating the behaviour for accuracy (Leedy and

Ormrod, 2001). In this research, direct observation is applied to collect quantitative data in performance measurement. As indicated, performance measurement is one of the variables investigated in this study. Observing users' performance with e-government websites on the particular tasks is an important aspect in which the actual users' interaction with the e-governments is objectively assessed. In addition, observation can produce data that show much of the richness and complexity of user interaction (Leedy and Ormrod, 2001), which leads to better understanding of the research questions. The detailed performance measurement, through direct observation, is presented in the research design (section 4.4.1).

4.3 Research instruments

There are three research instruments used in this study, which are the selected e-government websites, the task sheet and the usability and credibility questionnaire. The e-government website is selected as the representative of e-government and used to measure its usability and credibility. The task sheet contains a set of tasks that is developed for the participants to perform in the evaluation. The usability and credibility questionnaire is designed to identify the participants' assessment of usability and credibility. These instruments are described at the detailed level in the following sub-sections.

4.3.1 E-government websites

As mentioned earlier (see section 2.2.3), an e-government website serves as a window to communicate with users. It is the interface to e-government and regarded as a key priority for governments when they develop their e-government systems (Gant and Gant, 2002). Among a variety of e-government websites, the local level of e-government website is selected in this study for a number of reasons. There are: firstly, local level of e-government website is the closest level for users. Secondly, it is frequently used by the general public since local e-government is more informational for users and focuses on the needs of users in accessing information and services (Reddick, 2009). Thirdly, local level of e-government can significantly indicate the

effects of e-government on users (Tolbert and Mossberger, 2003). Fourthly, evidence from previous studies finds that bigger challenges exist at the local level of e-governments (e.g. Irani et al., 2005) and in their website design (e.g. Yang and Paul, 2005). Finally, since this research is carried out at Brunel University, it increases the interest in exploring e-government websites development in local areas. Therefore, experiment 1 uses three local e-government websites in the U.K: called London Authority 1, London Authority 2 and London Authority 3 (LA1, LA2 and LA3).

In addition, the purpose of experiment 2 is to assess the effects of the proposed design solutions on the usability and credibility problems found in experiment 1 on each target London Authorities. In order to conduct experiment 2, the target London Authorities used in experiment 1 will be redesigned based on the proposed design solutions. Furthermore, to clearly indicate that the proposed design solutions correspond to the problems found on the relevant e-government website, three redesigned London Authorities will be developed.

These three redesigned e-government websites will be based on the three target e-government websites used in experiment 1. Each redesigned e-government website corresponds to each target e-government website used in experiment 1 and the relevant proposed solutions will be designed for each of them. There are three phases in the construction of the redesigned e-government websites. Firstly, according to the problems identified in experiment 1, the corresponding proposed design solutions are provided for the redesigned e-government websites. Secondly, each redesigned e-government website is designed on the basis of the corresponding target e-government website used in experiment 1, retaining the same structure, layout and content. In addition, to consider that the redesigned e-government websites may contain sufficient information and services in order to build the participants' general perception in experiment 2, the redesigned e-government websites will cover rich information and provide a range of services. As such, the redesigned London Authority 1 is developed with a total of 133 web pages. The redesigned London Authority 2 is designed with a total of 92 web pages and a total of 95 web pages are designed in the redesigned London Authority 3. These web pages contain a variety of e-government information and services. Finally, the proposed design solutions will be applied to the redesigned e-government websites (the detailed design of the proposed

solutions on each target London Authority is described in Chapter 6). All the redesigned e-government websites are thoroughly pre-tested and further improved in a pilot study before the experiment starts (see Appendix 3b).

4.3.2 Task sheet

To conduct the evaluation, the participants are required to perform a set of practical tasks on the target e-government websites. Such tasks are representative activities that users would be expected to carry out on an e-government website. The task sheet is used to deliver these tasks to the participants for the usability and credibility evaluation. The construction of the task sheet involves four parts. The first part aims to identify the representative tasks in e-government services. In the second part, a time issue is considered to justify whether the tasks selected are reasonable and acceptable for the experiments. In the third part, a task description is addressed to ensure that the tasks designed are explicitly presented, so that the participants can easily understand their assignment in the experiments. The fourth part develops the task sheets in each target e-government website evaluation for the two experiments. The following subsections give detailed descriptions for each part of the task sheet design.

Task identification

Task identification attempts to analyse what tasks can be chosen from e-government in the real world. In addition, the tasks selected should be representative activities that users would be expected to conduct and can cover a range of e-government services. According to Garcia et al. (2005), there are three categories of e-government services: information distribution, products and services offered and user participation. Information distribution is related to the provision of all kinds of government information via the e-government website. Products and services offered refers to delivering one-way services to users, such as documents download, job searching and service registration. User participation involves users interacting with two-way services on the site, for example, taxes payment, school application and house plan decision making. The different types of tasks are identified according to these services categories.

However, there are a large number of tasks that can be identified from each service category. It is impossible to use all the tasks offered by e-government for the participants in the experiments. There are more tasks than there is time available. As a result, only a limited set of representative tasks can be selected and designed for the task sheet. In general, functional analysis (e.g. Lentz and Pander Maat, 2004) and user analysis (e.g. Dumas and Redish, 1999) are used to identify representative tasks. When comparing functional analysis and user analysis, the main difference is that the former identifies representative tasks from an experts' viewpoint and experiences, while the latter derives the tasks from applications that users normally engage with. Table 4.1 summarizes the main features in these two methods. It may be more reasonable to identify the tasks from a user perspective because all the tasks in e-government are designed for users who are the actual people to perform these tasks. Accordingly, user analysis is chosen for identifying representative tasks.

Table 4.1 Comparison of functional analysis and user analysis for task identification

Methods	Features
Functional analysis (Lentz and Pander Maat, 2004)	<ul style="list-style-type: none"> · Good idea to detect potential problems · Clear understanding of the system · Correct in knowing the major design problems · Quick to select tasks · Expert point of view
Users centred analysis (Dumas and Redish, 1999)	<ul style="list-style-type: none"> · New or modified tasks · The popular tasks · Critical to the operation of the system · Tasks done under pressure · Frequency of use · User viewpoint

Task selection time issues

Have identified the tasks, it is necessary to check whether those tasks identified can be appropriately chosen for the participants to perform in the experiments. Time is important in task selection. There are two time issues to consider as justification. The first issue is to examine the time for each task completion in order to ensure that the task selected is acceptable and appropriate in the experiments. If the time is too long, the tasks have to be eliminated. The second issue is the length of running all tasks, which needs to be reasonable for the participants to accept. Therefore, a pilot study

will examine the tasks and estimate a baseline to provide the acceptable time for the participants in the two experiments (see Appendices 3a, 3b).

Task description

To present the tasks to the participants, there are some considerations of the task description. Firstly, there is a need to balance the task description. Rich description provides more information about the tasks characters and assumed situation. However, the participants prefer concise and clear task description with as little distracting information as possible. Secondly, it is necessary to apply the simplest form, so that the participants may quickly understand their work in the evaluation. Furthermore, in order to indicate clear task arrangement for the participants, the study names “task 1”, “task 2”, “task 3” and etc. in order on the task sheets. Finally, there is concern about the support that discovers the participants' interaction in performing the tasks. The task sheet itself does not indicate what problems the participants faced. It is important to employ an observational technique at the same time as the task sheet to record the measureable data (see Appendix 12).

Task sheet design

Given that the selected tasks have been designed to represent different types of interaction that users normally engage in e-government services, a task sheet is used to deliver and describe the selected tasks to the participants in London Authority 1 evaluation. In addition, the same types of the tasks have been developed for London Authority 2 and London Authority 3 in experiment 1 (see Appendices 1a, 1b, 1c). However, there is a slight variation to the tasks in order to tailor to that specific local authority. Regarding experiment 2, in order to control the variables under the same conditions to support comparative performance analysis, and reduce the effects of prior task experience on users' task performance in experiment 2, the selected tasks for experiment 2 remain the same type used in experiment 1, but tasks content differ from the tasks used in experiment 1. Moreover, since experiment 2 aims to investigate the effects of the proposed design solutions on the e-government websites usability and credibility problems, therefore the selected tasks may reflect these design solutions, so that users may be able to notice them on the redesigned e-government

websites when they perform these tasks (see Appendices 2a, 2b, 2c). All the task sheets designed for the two experiments are thoroughly checked and pre-tested in a pilot study before the experiments start (see Appendices 3a, 3b).

4.3.3 Usability and credibility questionnaire

A questionnaire can be used to capture users' perception about usability and credibility of the target e-government websites. The design of this usability and credibility questionnaire is based on Nielsen's usability heuristics (Nielsen, 1994) and Fogg's credibility guidelines (Fogg, 2002) since a number of studies have validated the usefulness of these heuristics and guidelines in the evaluation of usability and credibility (see section 3.3 and 3.4). There are three steps in the questionnaire design. Firstly, there is a need to extend the existing usability heuristics and credibility guidelines in order to fit in the specific requirements of e-government. Secondly, a set of associated criteria for each heuristic and guideline are developed, in order to focus on the detailed aspects of usability and credibility. Finally, the specific questions are developed, based on these heuristic and guideline criteria.

Extension of heuristics and guidelines

Nielsen's usability heuristics and Fogg's credibility guidelines (see Table 3.1 and Table 3.3) have been widely used for usability and credibility inspection and their applicability and validation have been proved in a number of studies (e.g. Delice and Güngör, 2009; Hvannberg et al., 2007; Liu and Huang, 2005; Sidi and Junaini, 2006). In particular, these heuristics and guidelines can effectively discover usability and credibility issues in relation to website design (Fogg et al., 2003; Nielsen, 2000). As such, this study uses these heuristics and guidelines as a starting point to evaluate the e-government websites usability and credibility. However, these heuristics and guidelines were developed a number of years ago and in the context of general website usability and credibility evaluation purposes. In order to meet the specific needs of e-government websites, it is necessary to extend existing Nielsen's heuristics and Fogg's guidelines (The specific justification of the heuristic and guideline extension is presented in section 3.3 and 3.4).

In terms of usability, evidence from previous studies indicates that e-government is used by a wide range of people, while interoperability is important in terms of information and service exchange (Garcia et al., 2005). For example ensuring news is kept current between e-government and government. In addition, since e-government is used by diverse users who have heterogeneous skills, therefore, e-government should support users with different skills to access services in a simple way. Furthermore, during users' interaction with online services, e-government should respect their users at all times (Reddick, 2005). Therefore, the existing Nielsen's usability heuristics are extended by adding three further heuristics: 'Interoperability', 'Support and extend users' skills' and 'Pleasurable and respectful interaction with users' (see Table 3.2). The detailed requirements of these three heuristics are described in section 3.3.1.

In terms of credibility, evidence from relevant literature of e-government studies indicates that e-government is used for public administration. E-government transparency is important in terms of government operation processes and the provision of in-depth government information, such as public expenditure (Welch and Hinnant, 2003). In addition, since a variety of information and services have become available on e-government websites, therefore e-government websites need to deliver their services with flexible mechanisms that can support users developing their own ways to achieve the desired outcomes (Gant and Gant, 2002). Furthermore, all information and services are delivered and transacted via the Internet. Security and privacy are the key element in protecting such services in insecure areas (Bélanger and Carter, 2008). These concerns reflect the particular requirements of e-government websites and are closely related to user trust (Garcia et al., 2005). Therefore, based on these issues, three new guidelines for 'transparency', 'service agility' and 'privacy and security' are added to Fogg's ten credibility guidelines (The detailed descriptions of these extra guidelines are discussed in section 3.4.1).

Associated criteria development

Although Nielsen's usability heuristics and Fogg's credibility guidelines are extended in consideration of the needs of e-government and its users, it still plays as a broad

framework for usability and credibility evaluation. In other words, these heuristics and guidelines are too general to develop the usability and credibility questions in the questionnaire, so that e-government website usability and credibility might be assessed without enough depth. Furthermore, the lack of detailed analysis may lead to failure in specific usability and credibility problem identification. In this aspect, it is important to develop a set of associated criteria for each usability heuristic and credibility guideline. Such criteria are developed from relevant usability and credibility studies (e.g. Collins, 2006; O'Grady, 2006; Sonderegger and Sauer, 2010; Wathen and Burkell, 2002), and the interpretation of wider e-government studies (e.g. Jaeger, 2006; Sidi and Junaini, 2006; Tolbert and Mossberger, 2003). The findings of these studies are used to identify which website design factors and features may influence users' perception of usability and credibility, users' task performance or cause problems when users' interaction with the system. These factors and features are extracted to develop the criteria, and then grouped into corresponding heuristics and guidelines (see Table 4.2). By doing so, it can ensure that the maximum number of usability and credibility problems could be detected for the target e-government websites. In addition, it can provide a step by step process to closely focus on detailed aspects of usability and credibility.

Table 4.2 Criteria identification and classification

Usability heuristics	Associated criteria	Relevant studies
H1. Visibility of system status	<ul style="list-style-type: none"> - Every display has a title - Subject categories are displayed clearly - Different types of information are clearly separated from each other on the screen - Current status of page is clearly indicated - Information on the screen is easy to see and read 	Brinck et al., (2002); Barnes and Vidgen, (2004); Garcia et al., (2005); Henriksson et al., (2007); Huizingh, (2000); Nielsen, (2000)
H2. Match between system and the real world	<ul style="list-style-type: none"> - User is kept informed of system's progress - Selected colours correspond to common expectations - When prompts imply a necessary action, the words in the message are consistent with that action - Menu choices fit logically into categories that have readily understandable meanings 	Barnes and Vidgen, (2004); Brinck et al., (2002); Garcia et al., (2005); Huizingh, (2000); Nielsen, (2000)
H3. User control and freedom	<ul style="list-style-type: none"> - It is easy to conduct the task in any order - User control operations in progress - If the system has multiple menu levels, there is a mechanism that allows users to quickly start - Menus are broad (many items on a menu) rather than deep (many menu levels) 	Baker, (2009); Barnes and Vidgen, (2004); Brinck et al., (2002); Kappel et al., (2006); Nielsen, (2000)

H4. Consistency and standards	<ul style="list-style-type: none"> - Different colours are used consistently throughout the system - Different sizes are used consistently throughout the system - The same item of information is displayed in the same format - On-line instructions appear in a consistent location across screens - System objects are named consistently across all prompts in the system 	Baker, (2009); Barnes and Vidgen, (2004); Brinck et al., (2002); Nielsen, (2000); Ozok and Salvendy, (2001); Tractinsky et al., (2006)
H5. Error prevention	<ul style="list-style-type: none"> - The system prevents users from making errors whenever possible - The system warns users if they are about to make a potentially serious error - Data entry screens and dialog boxes indicate the number of character spaces available in a field - If the system has multipage data entry screens, each page has a sequential page number 	Baker, (2009); Brinck et al., (2002); Garcia et al., (2005); Nielsen, (2000); Tsakonas and Papatheodorou, (2008)
H6. Recognition rather than recall	<ul style="list-style-type: none"> - The data display starts in a conventional place - Items have been grouped into logical categories, and headings have been used to distinguish between categories - Text areas have "breathing space" around them 	Baker, (2009); Brinck et al., (2002); Garcia et al., (2005); Henriksson et al., (2007); Nielsen, (2000)
H7. Flexibility and efficiency of use	<ul style="list-style-type: none"> - The links are working properly - Menu choices are ordered a the logical way - The data display structure match the information selection structure - The menu structure matches the task structure 	Brinck et al., (2002); Garcia et al., (2005); Huizingh, (2000); Jul and Futnas, (1997); Nielsen, (2000); Tsakonas and Papatheodorou, (2008)
H8. Aesthetic and minimalist design	<ul style="list-style-type: none"> - Information is essential to decision making displayed on the screen - Each page is uncluttered - Meaningful groups of items are separated by colours - Correct colours use in links - White space is used to create symmetry and lead the eye in the appropriate direction 	Baker, (2009); Brinck et al., (2002); Garcia et al., (2005); Huizingh, (2000); Nielsen, (2000); Sonderegger and Sauer, (2010)
H9. Help user recognize, recover from errors	<ul style="list-style-type: none"> - Signal is used to indicate an error - Error message is brief and unambiguous - When an error is detected in a data entry field, the system should place the cursor in that field or highlight the error - Correct the error in previous section without retyping all the information 	Baker, (2009); Brinck et al., (2002); Kappel et al., (2006); Nielsen, (2000)
H10. Help and documentation	<ul style="list-style-type: none"> - On-line help adequately explains both user and system errors, and how these should be corrected - The help function is visible - Users can easily switch between help and their work 	Baker, (2009); Brinck et al., (2002); Kappel et al., (2006); Nielsen, (2000)
H11. Interoperability	<ul style="list-style-type: none"> - It is easy to recognise and understand abbreviations, acronyms, codes and other alphanumeric information on the screen - The organisation and structure of the system fit the user's perception of the task - Information presented is compatible with user's point of view 	Baker, (2009); Garcia et al., (2005); Klischewski and Scholl, (2006); Muller et al., (1998); Muller et al., (1995); Thompson et al., (2003)

H12. Support and extend users' skills	<ul style="list-style-type: none"> - Window operations are easy to use - The system performs data translations for users - Users can move forwards and backwards within a field 	Barnes and Vidgen, (2004); Garcia et al., (2005); Muller et al., (1998); Muller et al, (1995)
H13. Pleasurable and respectful interaction with users	<ul style="list-style-type: none"> - Each individual image is a harmonious member of a family of systems - Excessive text in content design has been avoided - Users turn on accessibility if necessary 	Barnes and Vidgen, (2004); Garcia et al., (2005); Muller et al., (1998); Muller et al, (1995); Reddick, (2005)
Credibility guidelines	Associated criteria	Relevant studies
G1. Site looks professional	<ul style="list-style-type: none"> - The content designed matches the organisation - Information is presented with the consistent colours - Information appear to be organized logically on the screen - Each page is labelled to show its relation to others 	Fogg et al., (2000); O'Grady, (2006); Liu and Huang, (2005); Robins and Holmes, (2008); Wathen and Burkell, (2002)
G2. Easy to verify the information accuracy	<ul style="list-style-type: none"> - The information is at the right level of detail - The information is well organised - The information is accurate - The URL is correct 	Collins, (2005); Fogg et al., (2000); O'Grady, (2006); Liu and Huang, (2005); Rains and Karmikel, (2009); Robins and Holmes, (2008); Sidi and Junaini, (2006)
G3. Show a real organization behind site	<ul style="list-style-type: none"> - The system clearly shows a postal address of the organisation - The system displays photos of offices or staff member - The system provides its accreditations with any other governmental bodies 	Collins, (2005); Fogg et al., (2000); Liu and Huang, (2005); Robins and Holmes, (2008); Sidi and Junaini, (2006)
G4. Highlight the expertise in your organization and in the content and services provided	<ul style="list-style-type: none"> - The system provides detailed information on its policies and services - The system is by an local council that is well trust - Instruments and messages displayed by the system are concise 	Fogg et al., (2000); Liu and Huang, (2005); Rains and Karmikel, (2009); Robins and Holmes, (2008); Sidi and Junaini, (2006)
G5. Show that honest and trustworthy people behind site	<ul style="list-style-type: none"> - The system provides an "about us" page, including information such as organisation history and its values - The system displays any awards it has earned - The system lists names of the people in charge of the local authority 	Burkell, (2002); Fogg et al., (2000); Robins and Holmes, (2008); Wathen and Burkell, (2002)
G6. Make it easy to contact you	<ul style="list-style-type: none"> - The system provides a "Contact" facility - The system offers different contact methods - The system shows detailed contact information 	Fogg et al., (2000); O'Grady, (2006); Liu and Huang, (2005); Sidi and Junaini, (2006)
G7. Make site easy to use and useful	<ul style="list-style-type: none"> - The system is easy to use - Navigating the system is easy - It is always clear what page I am on and how much of the quote process remains - The system is arranged in a way that makes sense to the user 	Fogg et al., (2000); O'Grady, (2006); Liu and Huang, (2005); Wathen and Burkell, (2002)
G8. Update site's content often	<ul style="list-style-type: none"> - The system is update to date 	O'Grady, (2006); Wathen and Burkell, (2002)
G9. Use restraint with any promotional content	<ul style="list-style-type: none"> - The system has limited ads on each page - The system make it easy to distinguish ads from content 	O'Grady, (2006); Huizingh; (2000); Robins and Holmes, (2008); Sidi and Junaini, (2006)

G10. Avoid errors of all types	<ul style="list-style-type: none"> - It is clear what this information should be when user enter information on the screen - The system has no broken links - The system is free from typographical errors 	Fogg et al., (2000); O'Grady, (2006); Robins and Holmes, (2008); Sidi and Junaini, (2006);
G11. Transparency	<ul style="list-style-type: none"> - The system monitors the budgetary execution - The system clearly states the system terms and conditions - When a user's task is completed, the system send a message to the user - It is clear to see progress in a task 	Ciborra, (2005); O'Grady, (2006); Robins and Holmes, (2008); Sidi and Junaini, (2006); Tolbert and Mossberger, (2003)
G12. Service agility	<ul style="list-style-type: none"> - The system allows the user to work at their own pace and direction - Ease to recall the information - The system offers agile functions 	Liu and Huang, (2005); Robins and Holmes, (2008); Sidi and Junaini, (2006)
G13. Privacy and security	<ul style="list-style-type: none"> - Protected or confidential areas can be accessed with certain passwords - A secure message appears when the user accesses private services 	Henriksson et al., (2007); Liu and Huang, (2005); Wathen and Burkell, (2002)

Each criteria developed refers to a requirement for a specific usability and credibility feature that should be conveyed and delivered by the questionnaire, which is used to examine the target e-government websites design. However, those target e-government websites differ in usability and credibility criteria. Thus, the researcher systematically checks these usability and credibility criteria against each target e-government website to indicate whether or not the target e-government websites meet this criteria list (see Table 4.3 for the detailed distinctions). These variances provide the basis for the usability and credibility questionnaire design for each target e-government website evaluation.

Table 4.3 Website usability and credibility criteria within the target e-government websites

Usability criteria	LA 1	LA 2	LA 3
1. Every display has a title	√	√	√
2. Subject categories are displayed clearly	√	√	×
3. Different types of information are clearly separated from each other on the screen	√	√	√
4. Location of the page is clearly indicated	√	×	√
5. Information on the screen is easy to see and read	√	√	√
6. User is kept informed of system's progress	√	√	√
7. Selected colours correspond to common expectations	√	√	√
8. When prompts imply a necessary action, the words in the message are consistent with that action	√	√	×
9. Menu choices fit logically into categories that have readily understandable meanings	√	√	√

10. It is easy to conduct the task in any order	√	√	√
11. User control operations in progress	√	√	√
12. If the system has multiple menu levels, there is a mechanism that allows users to quickly start	√	√	√
13. Menus are broad (many items on a menu) rather than deep (many menu levels)	√	√	√
14. Different colours are used consistently throughout the system	√	√	√
15. Different sizes are used consistently throughout the system	√	√	×
16. The same item of information is displayed in the same format	√	×	×
17. On-line instructions appear in a consistent location across screens	√	√	√
18. System objects are named consistently across all prompts in the system	√	√	√
19. The system prevents users from making errors whenever possible	√	×	√
20. The system warns users if they are about to make a potentially serious error	√	√	√
21. Data entry screens and dialog boxes indicate the number of character spaces available in a field	×	×	×
22. If the system has multipage data entry screens, each page has a sequential page number	√	√	×
23. The data display starts in a conventional place	√	√	√
24. Items have been grouped into logical categories, and headings have been used to distinguish between categories	√	√	√
25. Text areas have "breathing space" around them	√	√	√
26. The links are working properly	√	√	√
27. Menu choices are ordered in a logical way	×	√	√
28. The data display structure match the information selection structure	√	√	×
29. The menu structure matches the task structure	√	√	√
30. Information is essential to decision making displayed on the screen	√	√	√
31. Each page is uncluttered	√	√	√
32. Meaningful groups of items are separated by colours	√	√	√
33. Correct colours use in links	√	√	√
34. White space is used to create symmetry and lead the eye in the appropriate direction	√	√	√
35. Signal is used to indicate an error	√	√	√
36. Error message is brief and unambiguous	√	√	√
37. When an error is detected in a data entry field, the system should place the cursor in that field or highlight the error	√	√	√
38. Correct the error in previous section without retyping all the information	√	√	√
39. On-line help adequately explains both user and system errors, and how these should be corrected	√	√	√
40. The help function is visible	√	√	√
41. Users can easily switch between help and their work	√	√	√
42. It is easy to recognise and understand abbreviations, acronyms, codes and other alphanumeric information on the screen	√	√	√
43. The organisation and structure of the system fit the user's perception of the task	√	√	√
44. Information presented is compatible with user's point of view	√	√	√
45. Window operations are easy to use	√	√	√
46. The system performs data translations for users	√	√	√
47. Users can move forwards and backwards within a field	√	√	√

48. Each individual image is a harmonious member of a family of systems	√	√	√
49. Excessive text in content design has been avoided	√	√	√
50. Users turn on accessibility if necessary	√	√	√
Credibility criteria	LA 1	LA 2	LA 3
1. The content designed matches the organisation	√	√	√
2. Information is presented with the consistent colours	√	√	√
3. Information appear to be organized logically on the screen	√	√	√
4. Each page is labelled to show its relation to others	√	√	√
5. The information is at the right level of detail	√	√	√
6. The information is well organised	√	√	×
7. The information is accurate	√	√	√
8. The URL is correct	√	√	√
9. The system clearly shows a postal address of the organisation	√	√	√
10. The system displays photos of offices or staff member	√	√	√
11. The system provides its accreditations with any other governmental bodies	√	√	√
12. The system provides detailed information on its policies and services	√	√	√
13. The system is by an local council that is well trust	√	√	√
14. Instruments and messages displayed by the system are concise	√	√	√
15. The system provides an "about us" page, including information such as organisation history and its values	√	×	×
16. The system displays any awards it has earned	√	×	√
17. The system lists names of the people in charge of the local authority	√	√	√
18. The system provides a "Contact" facility	√	√	√
19. The system offers different contact methods	√	√	√
20. The system shows detailed contact information	√	×	×
21. The system is easy to use	√	√	√
22. Navigating the system is easy	√	×	√
23. It is always clear what page I am on and how much of the quote process remains	√	√	×
24. The system is arranged in a way that makes sense to the user	√	√	√
25. The system is up to date	√	√	√
26. The system has limited ads on each page	√	√	√
27. The system make it easy to distinguish ads from content	√	√	√
28. It is clear what this information should be when user enter information on the screen	√	√	√
29. The system has no broken links	√	√	√
30. The system is free from typographical errors	√	√	√
31. The system monitors the budgetary execution	√	√	√
32. The system clearly states the system terms and conditions	√	√	√
33. When a user's task is completed, the system send a message to the user	√	√	√
34. It is clear to see progress in a task	√	√	×
35. The system allows the user to work at their own pace and direction	√	√	√
36. Ease to recall the information	√	√	√
37. The system offers agile functions	√	√	√
38. Protected or confidential areas can be accessed with certain passwords	√	×	×
39. A secure message appears when the user accesses private services	√	√	√

(√ = covered, × = not covered, LA 1 = London Authority 1, LA 2 = London Authority 2, LA 3 = London Authority 3)

Usability and credibility questionnaire

Based on this development of associated criteria, a paper-based usability and credibility questionnaire is created for the purpose of capturing the participants' perception about usability and credibility of the target e-government websites. However, there is a slight variation in the questions designed in order to tailor to the differences of the website usability and credibility criteria detected in each London Authority. Furthermore, the same questions used in experiment 1 will also form the basis for the usability and credibility questionnaire in experiment 2. The participants are required to respond using a five-point Likert scale, which can indicate the participants' agreement level to the statements (strongly agree=5; strongly disagree=1). The main advantage of using five-point scales is that an odd number of responses format with a neutral level (neither agree nor disagree) in the middle does not force the participants to choose a positive (agree) or negative (disagree) option when they really do not have. Moreover, the quantitative results through a five-point Likert scale can be easily collected and analyzed.

In order to have a better understanding of the participants' perception of usability and credibility towards the target e-government websites, a qualitative approach through open-ended questions in the questionnaire is also developed to support the questionnaire results in the two experiments. The questionnaires are further improved and tested through a pilot study (see Appendices 3a, 3b). The usability and credibility questionnaires developed for experiment 1 and 2 are presented in Appendices 4a, 4b, 4c and Appendices 5a, 5b, 5c respectively.

4.4 Research design

As described in the research strategy (section 4.2.1), two experiments are designed in this study to gather data to investigate the research questions. Experiment 1 aims to evaluate usability and credibility of the target e-government websites, identifying existing usability and credibility problems. Experiment 2 attempts to evaluate the effects of the proposed design solutions on the usability and credibility problems identified in experiment 1 for each target e-government website. The evaluation of

usability and credibility of the target e-government websites is based on users' perception and performance in both experiments. This section presents the detailed research design of the two experiments.

4.4.1 Variables measurement

Perception measurement

Perception is the effects of perceiving while attitude is strongly agreeing with something (Gallagher, 2008). This study applies a heuristic evaluation, which is based on users' perception of sets of extensions of Nielsen's usability heuristics and Fogg's credibility guidelines, to implement a thorough and in-depth assessment of the e-government websites. In this context, users' perception is reflected in the participants' opinions and resulting choices from a range of options expressed through the usability and credibility questionnaire. It can provide the participants' insight into the e-government websites usability and credibility, indicating what e-government website features can cause the participants' most concern about usability and credibility. Users' perception is identified by both quantitative and qualitative approaches through the questionnaire. The quantitative approach uses the results from the closed questions of the questionnaire to reveal the participants' judgments of the e-government websites usability and credibility, while, the qualitative approach uses the results from the open-ended questions to indicate the participants' further thoughts about the usability and credibility of the e-government websites.

Performance measurement

Performance measurement is a process of assessing performance achievement. Within the evaluation, the participants are required to accomplish a set of tasks on the target e-government websites. It attempts to reveal the level of users' interaction with the target e-government websites when users perform a set of practical tasks. Users' performance is measured by a set of performance criteria through observation. These measurable criteria include the amount of online help required; time spent completing tasks; number of steps to finish tasks and number of successful tasks completion. By focusing on such criteria, it is helpful to measure the users' interaction with each

target e-government website. In addition, to support comparative data analysis of the performance results between experiment 1 and 2, the same measurable criteria used in experiment 1 are applied to experiment 2. To observe the same aspects of the participants' performance, the same performance measurement is followed for all the tasks in experiment 1 and 2. Additionally, to avoid the potential problems of differences among the participants due to different observers, the same observer is involved in the two experiments.

4.4.2 Participants

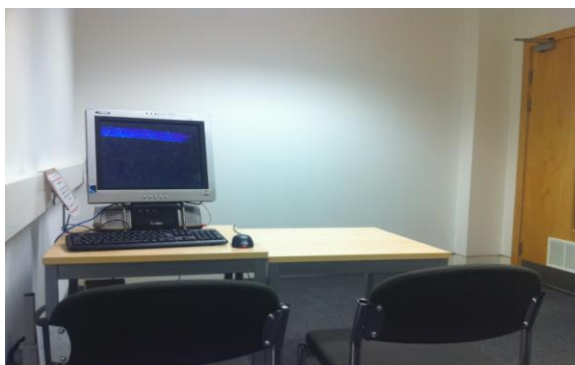
To choose the number of the participants for the evaluation, Nielsen and Molich (1990) found that half of the major problems can be identified by three participants. Virzi (1992) detected that 80% of the problems will be found with between 4 and 5 participants and 90% of the problems can be found with 10 participants. Dumas and Redish (1999) suggested 6 to 12 participants to join in evaluation, and argued that additional participants are less and less likely to detect new information. Furthermore, there is a need to consider research time, budget and importance of statistical significance for the results. 36 participants are assigned to evaluate three target e-government websites in experiment 1. Each target e-government website evaluation involves 12 participants. In addition, to control research conditions and support comparative data analysis between experiments 1 and 2, the same participants have been also invited for experiment 2. 12 participants are allocated for each redesigned e-government website, and they are the same participants who have taken part in experiment 1. The participants who are enthusiastic to do evaluation are preferable since this can reduce any motivation differences. To recruit the participants, some of them are found from personal networks, which is an inexpensive way to get the participants from the general public. In addition, other participants are recruited from the public places such as local libraries, leisure centres, and universities.

4.4.3 Research environment and materials

Research environment

To carry out the experiments, there is a need to define the research environment and conditions (Rates, 2004), including the physical requirements. Firstly, it requires a closed and quiet experimental room where only the participants and observer sit in. Furthermore, necessary hardware, such as personal computer, Internet access, Internet cable and wireless network card and software need to be pre-prepared in the experimental study (see Figure 4.2).

Figure 4.2 Experimental room in the study



Research materials

To carry out the assessment, it is necessary to prepare all relevant materials for the participants and the experiments. To protect the participants, the ethics approval letter is applied and received (see Appendix 16). In addition, a consent form is developed which provides detailed information about the participants' rights during the study period (see Appendix 6). To introduce the experiment, an information sheet is offered that briefly presents the study aim and experimental procedure (see Appendices 7a, 7b). To observe the participants' performance, a performance measurement form is developed for the observer (see Appendix 12). Furthermore, in order to assess the usability and credibility of the e-government websites, the task sheet, the usability and credibility questionnaire have already been prepared.

4.4.4 Experimental procedure

Experiments 1 and 2 follow the same experimental procedure. Each experiment is run individually. It normally took one and half hours to complete the whole assessment. Before the experiment commences, the participants are given a brief introduction to the purpose of this experiment (see Appendices 7a, 7b). This is followed by an evaluation protocol given to each participant with greeting words and consent form (see Appendix 6). After that, the participants start their assessment, which consists of three phases: free-flow inspection, task-based interaction and completing the questionnaire. Free-flow inspection allows the participants to look through the target e-government website several times. They can freely either look at the overall e-government website or focus on the specific website design elements. In this way, it can provide the participants with the initial interaction with e-government websites and their general perception may be developed. Subsequently, the participants are required to complete a set of tasks on the target e-government website. To deliver these tasks to the participants, a task sheet is provided as an instrument to transfer and describe the selected tasks to the participants (see Appendices 1a, 1b, 1c; 2a, 2b, 2c). The participants are asked to implement the tasks one by one without time limit. While the participants perform these tasks, their performance is observed. Having accomplished all the tasks, the participants are finally asked to fill in the usability and credibility questionnaire, in order to indicate their assessment of the target e-government websites (see Appendices 4a, 4b, 4c; 5a, 5b, 5c).

4.4.5 Pilot study

A pilot study is a rehearsal which is conducted prior to the experiments commencement (e.g. Cunliffe et al., 2001; Sonderegger and Sauer, 2010; Zaharias and Poylymenakou, 2009). It aims to determine whether the experiments are appropriate on a number of measures. The measures used in experiment 1 are as follows:

1. To examine the time for each task completion in order to provide reasonable task selection
2. To examine the time taken to run the experiment so that this can be controlled

- at an acceptable level for the participants
3. To test whether the user task sheets are appropriate
 4. To check whether the questions in the questionnaires are understandable and will not be misinterpreted
 5. To test whether the experimental procedure is appropriate

If any potential problems are found in the research pilot, corresponding adjustment will take place. In addition, for the same purpose of experiment 2, a pilot study is also carried out before experiment 2 starts. Although the experimental procedure used in experiment 2 is same as experiment 1, the usability and credibility questionnaire, the task sheet are different from experiment 1. In addition, the target e-government websites will be redesigned based on the usability and credibility problems found in experiment 1. Therefore, it is necessary to conduct another pilot study to determine whether experiment 2 is appropriate on a number of measures. These measures for experiment 2 are as follows:

1. To examine the time for each task completion in order to provide reasonable task selection
2. To examine the time taken to run the experiment so that this can be controlled at an acceptable level for the participants
3. To test whether the user task sheets are appropriate
4. To check whether the questions in the questionnaires are understandable and will not be misinterpreted
5. To check whether the proposed design solutions are integrated well with the e-government websites from experiment 1
6. To check the function of the redesigned e-government websites
7. To test whether the experimental procedure is appropriate

4.5 Data analysis

Having described and justified the research method and the experimental design in the previous sections, both data obtained from the questionnaire and the performance observation are analysed. This section discusses the data analysis techniques used in

the study. It starts with the analysis of the statistical tests needed for this study. Then, it identifies the appropriate data analysis method employed in this study by reviewing relevant studies. Finally, it presents the specific statistical techniques for data analysis used in the two experiments.

4.5.1 Selecting the appropriate analysis method

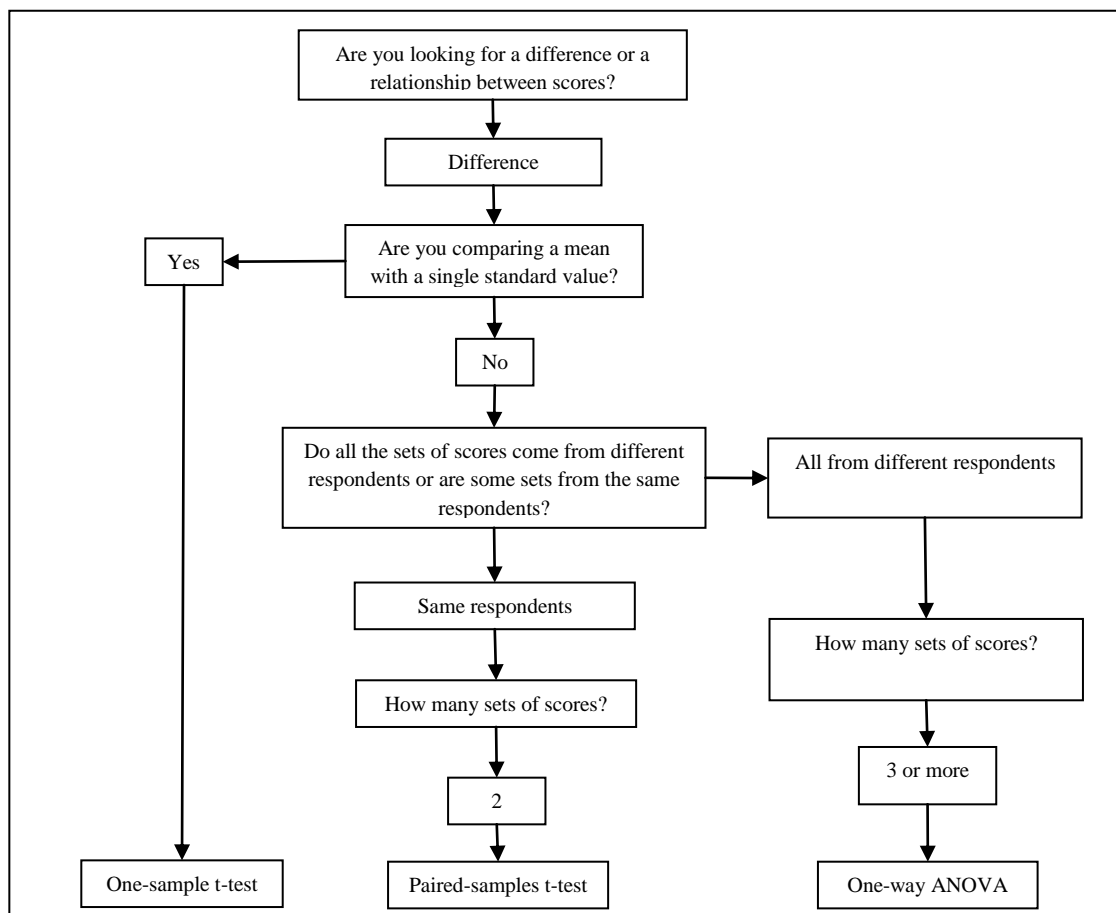
When analysing data, it is important to select the appropriate statistical tests. As indicated by Foster (2001), choosing appropriate data analysis techniques are largely dependent on the research aim. This research is an empirical study with two linked experiments. Experiment 1 aims to evaluate usability and credibility based on users' perception and their performance toward three target London Authorities in the UK. The aim of experiment 2 is to examine the effects of the proposed design solutions on the usability and credibility problems found in experiment 1 on three redesigned London Authorities.

More specifically, experiment 1 attempts to look for whether there are differences of users' perception and performance among three target London Authorities. In addition, it attempts to identify the usability and credibility strengths and problems by indicating whether the participants' perception of specific feature of usability and credibility has a difference on their perception of overall usability and credibility in each target London Authority respectively. Regarding experiment 2, it attempts to look for whether there is a significant difference in the participants' perception of the specific usability and credibility feature between experiment 1 and 2. In terms of users' performance, it attempts to investigate whether users' performance with the redesigned e-government websites in experiment 2 has differences compared with their performance in experiment 1.

Figure 4.3 identifies the statistical tests needed for this study. Based on the analysis requirements, a one-way ANOVA is the most appropriate data analysis technique in experiment 1 for analysing the differences among three sets of data (Pallant, 2001); such as determining the differences of users' perception among three London Authorities, and the differences of users' performance in three London Authorities.

Furthermore, a one-sample T-test is most appropriate for the analysis of the differences in two sets of data in experiment 1 (Hinton et al., 2004); such as the differences between users' perception of overall usability and their perception of specific usability features, and the differences between users' perception of overall credibility and their perception of specific credibility features. In experiment 2, a Paired-Samples T-test is most appropriate for comparing and analysing data between two sets of data (Kinnear, 2008); such as comparing the differences in users' perception of the specific usability features between experiment 1 and experiment 2, comparing the differences in users' perception of the specific credibility features between experiments 1 and 2, and comparing the users' performance differences between experiments 1 and 2.

Figure 4.3 Deciding which statistical test to use (Foster, 2001; p.21)



Furthermore, the one-way ANOVA; the one-sample T-test and the Paired-Samples T-test have been popularly employed in a number of studies. Table 4.4 indicates relevant

studies and presents the variables measured within relevant studies and data analysis used. Evidence from these previous studies has suggested the usefulness of the one-way ANOVA analysis for three sets of data or more, the one-sample T-test analysis for two sets of data, and the Paired-Samples T-test for comparing the difference between two variables.

Table 4.4 Data analysis used in relevant studies

Relevant studies	Variables measurement	Data analysis used
Ahmed et al. (2006)	- Comparing performance differences between Novice and experienced searchers - Comparing performance differences among age, gender, training, computer experience and status groups	- Independent sample t-test - One-way ANOVA
Choudrie and Gheorghita (2005)	- Comparing user perceptions among age groups	- One-way ANOVA
Cho, (2004)	- Analysing the relationship between two designated factors	- T-test
Dutta-Bergman (2004)	- Examining the relationship among three variables of completeness manipulation	- One-way ANOVA
Petrie and Kheir (2007)	- Comparing mean ratings of severity of problems encountered by blind and sighted participants	- Paired-Samples T-test
Tormala et al., (2006)	- Analysing the variance with source credibility as independent variables and attitudes, perceived expertise, self-reported elaboration, thought favourability as dependent variables	- One-sample T-test - Analysis variance (ANOVA)
Fogg et al., (2001)	- Investigating the participants' perception of credibility features between age groups, gender groups, country groups and education groups	- T-test
Collins, (2006)	- Examining perceptions of web pages trust between two participant groups	- Independent-samples T-test
Ivory et al., (2001)	- Exploring the different effects of the two groups of the participants on each usability metric	- T-test
Tractinsky et al. (2006)	- Comparing perceptions of website attractiveness among three target groups	- ANOVA

4.5.2 Analysis methods

Analysis methods for experiment 1

As indicated, the data analysis techniques used for experiment 1 are the one-way ANOVA and the one-sample T-test. Statistical analysis of the data is conducted using the Statistical Package for Social Science (spss) for windows (version 13). The significant value (P) is pre-defined as less than 0.05. The following is a detailed explanation of the specific statistical techniques for data analysis in experiment 1:

To indicate whether the three London Authorities have a difference towards the participants' overall perception of usability and credibility, a one-way ANOVA is conducted with three London Authorities as independent variables and usability and credibility perception as dependent variables respectively.

To indicate whether there is a difference between the perception of overall usability and the perception of specific usability features in each target London Authority, a one-sample T-test is conducted. This analysis technique is also used to show whether the perception of specific credibility features make a difference towards the perception of overall credibility in each target London Authority.

To indicate whether the three London Authorities show differences in the participants' performance, a one-way ANOVA is employed with the three target London Authorities as independent variables and performance in terms of the amount of online help required; time spent completing tasks; number of steps to finish tasks and number of successful tasks completion as dependent variables respectively.

To analyse the results from the open-ended questions of the questionnaire (i.e. the qualitative data), a form of content analysis based on frequency of the participants' responses is used to indicate usability and credibility strengths and weaknesses in each target London Authority respectively.

Analysis methods for experiment 2

A Paired-Samples T-test is used to analyse the data for experiment 2. The significant value (P) is defined as less than 0.05. The detailed information for data analysis in experiment 2 is:

For the each redesigned London Authority, to determine whether there is a difference in users' perception of the specific usability features between experiment 1 and experiment 2, a Paired-Samples T-test is used. This analysis technique is also used to indicate whether users' perception of the specific credibility features in experiment 2 is different from their perception in experiment 1.

In addition, for the each redesigned London Authority, to determine whether there is a difference of users' performance in terms of the amount of online help required; time spent completing tasks; number of steps to finish tasks and number of successful tasks completion between experiment 1 and experiment 2, a Paired-Samples T-test is also used.

To analyse the results from the open-ended questions of the questionnaire (i.e. the qualitative data), a form of content analysis based on frequency of the participants' responses is used to indicate users' further thoughts about the proposed usability and credibility design solutions in each redesigned e-government website respectively.

4.6 Summary and conclusion

This chapter describes the research methodology used in this study. It identifies and justifies the experimental study as the most appropriate research strategy to be employed in this study. To conduct the study, a mixed approach with an emphasis on the quantitative elements is implemented. In addition, both quantitative data and qualitative data are collected through the questionnaire and observation research techniques. Moreover, research instruments and research design for the two experiments are also indicated. The main research instruments are the selected e-government websites, the tasks sheet and the usability and credibility questionnaire. The research design covers the variables measurement, the participants, research environment and materials, the experimental procedure and the pilot study. Data analysis techniques employed in this research are also described based on the data analysis requirements and the suggestions from relevant studies, which identifies that the one-way ANOVA and the one-sample T-test are the most appropriate analysis method for analysing data in experiment 1, and the Paired-Samples T-test is the most suitable analysis technique for analysing data in experiment 2.

Having indicated the research methodology employed in this study, the following chapters will present the research results. More specifically, the results of experiment 1 that evaluates the usability and credibility of the target e-government websites will be presented in Chapter 5. Based on the identified usability and credibility problems,

the proposed design solutions will be described in Chapter 6, and the results of experiment 2 that assesses the improved usability and credibility will be presented in Chapter 7.

CHAPTER 5

EXPERIMENT 1: USABILITY AND CREDIBILITY EVALUATION

5.1 Introduction

Having described in Chapter 4 the research methodology of the study, Chapter 5 presents and discusses the results of experiment 1. This chapter is designed to investigate research questions 1 and 2 (RQ1: What are the existing usability problems in current e-government websites? RQ2: What are the existing credibility problems in current e-government websites?). More specifically, it aims to evaluate usability and credibility on the basis of users' perception and performance toward three target London Authorities. Users' perception employs the results from the questionnaires to present usability and credibility assessment of each target e-government website, while users' performance is measured through observation in order to indicate the level of users' interaction with the target e-government websites. More significantly, the effects of users' perception of usability and credibility on their performance are also indicated.

This chapter is structured as follows. It starts with describing the participants (section 5.2), this is followed by presenting and discussing the results in terms of users' perception (section 5.3) and users' performance (section 5.4). Finally, the summary and conclusion is presented in section 5.5.

5.2 Description of the participants and their responses

This section provides the description of the participants in relation to their demographic information and responses. More specifically, the former is based on the participants' characteristics in terms of gender, age and Internet use to indicate the distribution of the participants in the three target e-government websites, while the latter is used to reveal the distribution of data obtained from users' perception and

performance in each target e-government website. The following sub-sections present the detailed description.

5.2.1 Description of the participants

Participants' demographic information includes gender, age and Internet use and is collected through the questionnaire. A total of 36 participants took part in experiment 1, with 12 participants being randomly allocated for each target e-government website. Tables 5.1 and 5.2 show the distribution of the participants' gender and age characteristics in each e-government website assessed.

Table 5.1 Distribution of the gender characteristic

	Male		Female	
	N	%	N	%
London Authority 1	6	50.0	6	50.0
London Authority 2	6	50.0	6	50.0
London Authority 3	7	58.3	5	41.7

Table 5.2 Distribution of the age characteristic

	20-25 years old		26-30 years old		31-35 years old		36-40 years old		40+ years old	
	N	%	N	%	N	%	N	%	N	%
London Authority 1	0	0	6	50	4	33.3	2	16.7	0	0
London Authority 2	1	8.3	4	33.3	4	33.3	1	8.3	2	16.7
London Authority 3	4	33.3	2	16.7	4	33.3	1	8.3	1	8.3

In addition, the participants' level of Internet use is also assessed through the questionnaire in terms of the hours per week spent on the Internet. More specifically, the mean of the participant level of Internet use in London Authority 1 is 3.75 hours with a standard deviation of 1.42 hours. Regarding London Authority 2, the mean of the participant level of Internet use is 3.58 hours with a standard deviation of 1.68 hours. In addition, the mean of the participant level of Internet use in London Authority 3 is 4.33 hours with a standard deviation of 1.23 hours. Table 5.3 shows the distribution of the participants' level of Internet use in three London Authorities.

Table 5.3 Distribution of the Internet use

	Less than 4 hours		5-9 hours		10-14 hours		15-20 hours		More than 20 hours	
	N	%	N	%	N	%	N	%	N	%
London Authority 1	1	8.3	2	16.7	1	8.3	3	25.0	5	41.7

London Authority 2	2	16.7	2	16.7	1	8.3	1	8.3	6	50.0
London Authority 3	1	8.3	0	0	1	8.3	2	16.7	8	66.7

According to the participants' demographic information in terms of gender, age and Internet use in each target London Authority, it seems that the participants are equally allocated across the three target e-government websites. As a result, it may imply that the distribution of the participants in each target London Authority is by and large unbiased.

5.2.2 Description of the participants' responses

The statistical analysis techniques used in this study (e.g. one-way ANOVA and one-sample T-test) are only meaningful for the set of data that follows a normal distribution. Thus, this section describes data obtained from users' perception and performance to reveal whether the distribution of these sets of data follows a normal distribution. To assess distribution normality, the one sample Kolmogorov-Smirnov test (K-S test) is considered appropriate since it is commonly used to statistically analyze data normality (Foster, 2001; Hinton et al., 2004), and a number of studies have proven its usefulness and validity (Kinnear, 2008; Pallant, 2001). Thus, a one sample K-S test is used for determining whether or not the participants' responses to the usability and credibility questionnaires in each target e-government website follow a standard normal distribution. Equally, a one sample K-S test is employed to indicate whether or not the set of data from the participants' performance with each e-government website assessed is a standard normal distribution. Within the one sample K-S test, significant P-value indicates the probability that the sample distribution is different from an expected probability distribution (e.g. a normal distribution). If the significant value (P-value) is greater than 0.05, it indicates that the data set follows a normal distribution. Conversely, results suggest the distribution of the set of data is not a normal distribution when the significant value (P-value) is less than 0.05.

Tables 5.4, 5.5 and 5.6 present the results of one sample K-S test regarding the participants' responses of the usability and credibility questions in London Authority 1, 2 and 3 respectively. As shown in Table 5.4, the results of one sample K-S test indicate that the significances of the participants' responses to the usability questions

and the credibility questions in London Authority 1 are greater than the P-value of 0.05. Therefore, it implies that the distribution of the participants' responses to the usability and credibility questions in London Authority 1 follows a normal distribution. With respect to London Authority 2, the one sample K-S test results reveal that the significances of the participants' responses to the usability questions and the credibility questions are both more than $P=0.05$ (see Table 5.5). It suggests that the distribution of the participants' responses to the usability and credibility questions in London Authority 2 is a normal distribution. With regard to London Authority 3, the significances of the one sample K-S test in terms of the participants' responses to the usability questions and the credibility questions are presented in Table 5.6, which are both greater than the predefined P-value 0.05. As such, it appears to indicate that the distribution of the participants' responses to the usability and credibility questions in London Authority 3 follows a normal distribution (see Appendix 13a for the detailed one sample K-S test results).

Table 5.4 Usability and credibility responses distribution in London Authority 1

London Authority 1	Usability questions responses	Credibility questions responses
Significance	0.512	0.701

Table 5.5 Usability and credibility responses distribution in London Authority 2

London Authority 2	Usability questions responses	Credibility questions responses
Significance	0.241	0.820

Table 5.6 Usability and credibility responses distribution in London Authority 3

London Authority 3	Usability questions responses	Credibility questions responses
Significance	0.279	0.238

Additionally, Tables 5.7, 5.8 and 5.9 present the one sample K-S test results of the participants' performance in London Authority 1, 2 and 3 respectively. In detail, as shown in Table 5.7, the significance of the participants' performance in terms of time spent completing tasks; number of steps to finish tasks; the amount of online help required and number of successful tasks completion in London Authority 1 is greater than the predefined P-value 0.05. Accordingly, the findings suggest that the distribution of the participants' performance with London Authority 1 follows a normal distribution (see Appendix 13a for the detailed one sample K-S test results).

Regarding London Authority 2, Table 5.8 shows that the significance of the participants' performance in aspects of time spent completing tasks; number of steps to finish tasks; the amount of online help required, and number of successful tasks completion is more than $P=0.05$. Thus, it indicates that the distribution of the participants' performance with London Authority 2 follows a normal distribution (see Appendix 13a for the detailed one sample K-S test results).

Furthermore, the one sample K-S test results reveal that the significance of the participants' performance with London Authority 3 in terms of time spent completing tasks; number of steps to finish tasks, and number of successful tasks completion is greater than P-value 0.05. However, as there is no help required for tasks completion in London Authority 3, this significant value becomes not available (see Table 5.9). Accordingly, these findings imply that the distribution of the participants' performance in terms of time spent completing tasks; number of steps to finish tasks, and number of successful tasks completion with London Authority 3 follows a normal distribution (see Appendix 13a for the detailed one sample K-S test results).

Table 5.7 Performance distribution in London Authority 1

London Authority 1	Total time for all tasks completion	Number of steps to complete tasks	Helps required for tasks completion	Number of successful tasks completion
Significance	0.841	0.968	0.130	0.390

Table 5.8 Performance distribution in London Authority 2

London Authority 2	Total time for all tasks completion	Number of steps to complete tasks	Helps required for tasks completion	Number of successful tasks completion
Significance	0.371	0.818	0.203	0.141

Table 5.9 Performance distribution in London Authority 3

London Authority 3	Total time for all tasks completion	Number of steps to complete tasks	Helps required for tasks completion	Number of successful tasks completion
Significance	0.949	0.750	N/A	0.102

5.3 Users' perception

Users' perception is the participants' opinion and choices from a range of options through the usability and credibility questionnaire. It aims to evaluate usability and credibility of the target e-government websites. Both quantitative and qualitative data are collected to indicate users' perception of usability and credibility for each target e-government website. More specifically, the former applies the results from the closed questions of the questionnaire to indicate the participants' assessments of usability and credibility (section 5.3.1), while, the latter presents the participants' further thoughts on the successful and problematic features of the e-government websites from the open-ended questions of the questionnaire to point out the usability and credibility strengths and weaknesses (section 5.3.2).

5.3.1 Users' perception: quantitative data

This section details the participants' perception of usability and credibility of each target e-government website from quantitative data. This section contains three parts, which are the overall users' perception, users' perception of strengths and users' perception of problems. The overall perception describes the overview assessment of usability and credibility of the three target e-government websites. Users' perception of strengths and problems presents the detailed level of assessment, in which the sets of usability and credibility strengths and problems have been identified in each target e-government website respectively. The following sub-sections report the results in these areas.

5.3.1.1 Overall users' perception of usability and credibility

The overall perception is used to indicate the participants' overview evaluation of usability and credibility for each target e-government website. In addition, it can comparatively analyse the overall usability and credibility assessment among the three e-government websites. As shown in Table 5.10, the results of the one-way ANOVA show that there is a significant difference in the overall participants' perception of

usability ($F=8.784$, $P=0.010$) among the three target London Authorities (see Appendix 14 for the detailed one-way ANOVA results). As a lower mean indicates a worse overall assessment, thus, London Authority 2 has the worst overall usability assessment, with a mean of overall usability of 3.323 and a standard deviation of 0.367. London Authority 1 is placed next, with a mean of overall usability assessment of 3.445 and a standard deviation of 0.304. The e-government website with the best overview usability assessment is found to be London Authority 3, with a mean of overall usability of 3.843 and a standard deviation of 0.275.

Table 5.10 Overall perception of usability in the target London Authorities

	London Authority 1		London Authority 2		London Authority 3		
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	
Overall usability	3.445	0.304	3.323	0.367	3.843	0.275	
Significance						F=8.784, p=0.001	

In addition, the results of the one-way ANOVA show that there is also a significant difference in the overall participants' perception of credibility in the three e-government websites ($F=4.885$, $P=0.014$) (see Appendix 14 for the detailed one-way ANOVA results). Table 5.11 presents the overall evaluation of credibility among the three target London Authorities. Likewise, a lower mean reveals a worse overall assessment. Accordingly, London Authority 2 has the worst overall evaluation, with a mean of overall credibility of 3.436 and a standard deviation of 0.322. London Authority 1 is placed next, with a mean of overall credibility evaluation of 3.699 and a standard deviation of 0.432. London Authority 3 has the best overall evaluation, with a mean of overall credibility evaluation of 3.885 and a standard deviation of 0.291.

Table 5.11 Overall perception of credibility in the target London Authorities

	London Authority 1		London Authority 2		London Authority 3		
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	
Overall credibility	3.699	0.432	3.436	0.322	3.885	0.291	
Significance						F=4.885, p=0.014	

According to these results, it seems clear that London Authority 3 has the best overall usability, while London Authority 2 has the worst overall usability among the three target e-government websites. These findings are echoed in the results of the overall perception of credibility, which indicates that London Authority 3 has the best overall credibility, while London Authority 2 has the worst overall credibility among the

three e-government websites evaluated. Therefore, it suggests that overall London Authority 2 has the worst assessment of usability and credibility in the three target e-government websites. This is followed by London Authority 1. The e-government website with best overall usability and credibility assessment is shown to be London Authority 3.

Furthermore, based on these overall findings, it is interesting to see the relationship between usability and credibility. More specifically, the results show that London Authority 3 has the best overall usability, which is associated with the best overall credibility, and vice versa. Similarly, London Authority 2 has the worst overall usability, which is associated with the worst overall credibility, and vice versa. Accordingly, it may imply that usability and credibility have a close correlation. In other words, users' perception of usability and credibility positively influence each other. Such findings appear to support the results from previous studies (Fogg et al., 2001; Carter and Bélanger, 2005; Garcia et al., 2005), which found that there is an interrelationship between usability and credibility in web-based online systems. As suggested by Fogg et al. (2000), usability improvement is very likely to enhance credibility. Equally, credibility closely relates to usability in web design, which has the mutual impact between them (Nielsen, 1999). As such, usability and credibility may need to be considered together.

5.3.1.2 Users' perception of usability and credibility strengths

Having indicated the overall perception of usability and credibility, this section describes the detailed level of the participants' perception in terms of usability and credibility strengths for each target London Authority. To identify the usability and credibility strengths, a one-sample T-test is firstly used to determine whether each usability and credibility feature perceived has a significant difference towards the perception of overall usability and credibility respectively. If a significant difference is indicated, the usability feature with a mean score greater than the overall usability mean score is selected as a usability strength. Likewise, the credibility feature with a mean score greater than the overall credibility mean score is selected as a credibility strength. In addition, among the usability and credibility strengths identified, a higher

mean score presents a more outstanding strength. In this way, a number of the usability and credibility strengths have been found in each target e-government website. Tables 5.12, 5.13, 5.14, 5.15, 5.16 and 5.17 display all the usability and credibility strengths identified in London Authority 1, 2 and 3 respectively. The following sub-sections present and discuss these usability and credibility strengths.

London Authority 1

Based on the one-sample T-test results, there are a number of usability and credibility strengths that have been found in London Authority 1, which are presented in Tables 5.12 and 5.13 (see Appendix 8a for the detailed one-sample T-test results). Table 5.12 presents all the identified usability strengths in London Authority 1. As shown in the table, the most significant usability strength detected is that users can easily move forward and backward within the different fields of the e-government website. For example, the left side menu bar on every page presents the links of the visited places and provides further movement options, so that users can easily go backward and forward by clicking relevant links or options within the site (see Figure 5.1). The provision of forward and backward function is used to form navigation cues, which can facilitate site orientation. It can reinforce users' ability to ascertain their navigational control, so that users can guide their movement around the site to locate related objects. As indicated by Lemahieu (2002), forward and backward navigation buttons are very efficient means for navigating, which supports users' efficiency of information retrieval (Tung et al., 2003). Accordingly, the usability strength of easy forward and backward movement within the different fields of London Authority 1 strengthens the site navigation capability, which may support users' movement around the site to achieve their desirable services outcomes.

Figure 5.1 Easy forward and backward movements within London Authority 1

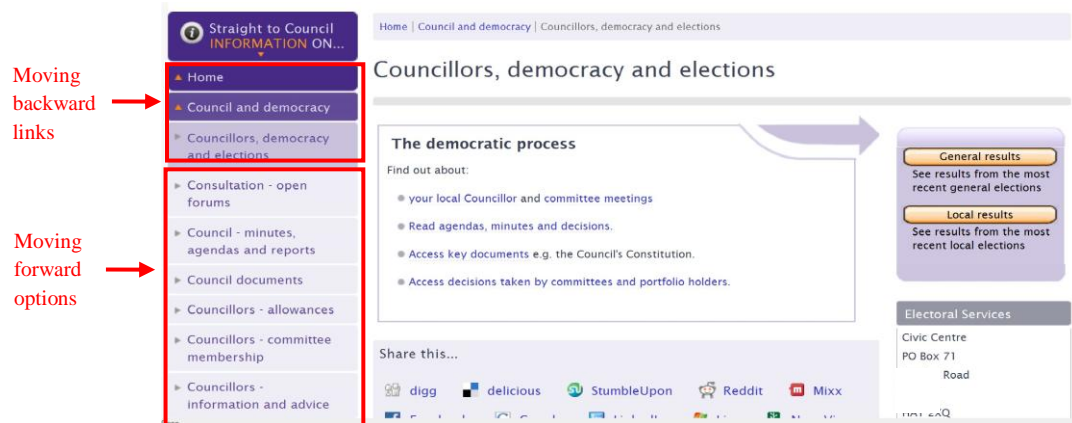
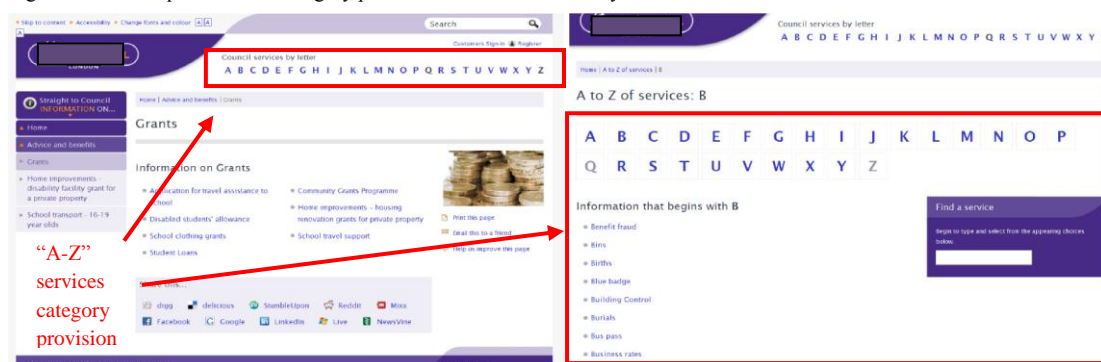


Table 5.12 Usability strengths in London Authority 1

Usability strengths	Mean (Std. deviation)
Users can move forward and backward within different fields of the site.	4.33 (0.49)
Significance	T=6.215, P=0.000
Site offers "A-Z" service that supports users to quick find the relevant information for the specific tasks.	4.08 (0.79)
Significance	T=2.767, P=0.018
Different displays on each page are compatible through the site	3.92 (0.52)
Significance	T=3.139, P=0.009

In addition, a usability strength found in London Authority 1 is that the site offers an "A-Z" service category that supports users to quickly find the relevant information and service (see Figure 5.2). An "A-Z" service category is used to aid services access, performing two main functions: organising a variety of services offered by the e-government into alphabetical order, and helping users to access the relevant service quickly and easily. By providing such a feature, users can speed up their subject identification (Brinck et al., 2002), and easily access relevant services without going through the multiple menu levels. Therefore, it may improve users' subject searching effectiveness.

Figure 5.2 “A-Z” quick service category provision in London Authority 1



Furthermore, a usability strength identified is that different display elements on each page are compatible through the site. For example, text font, font size, text density and white space are employed appropriately for content presentation. Display compatibility refers to harmonious presentation in terms of text size, content space, chosen colour and images on the site. It can visually build effective communication with users, supporting the site's overall aesthetics and reducing content complexity. As indicated by Tuch (2009), visual complexity results in users' reaction time delay and object cognition difficulty. Therefore, when different aesthetic elements are compatible on the London Authority 1 website, it can reduce the website's visual complexity and promote the content presentation, so that users may more easily read information and conduct services within the site.

Table 5.13 Credibility strengths in London Authority 1

Credibility strengths	Mean (Std. deviation)
The URL properly presents the domain name of the local council.	4.33 (0.65)
Significance	T=3.368, P=0.006
The content of the site matches with information user expect to obtain from a local council.	4.25 (0.45)
Significance	T=4.213, P=0.001
Some personal services are protected with a password.	4.17 (0.72)
Significance	T=2.252, P=0.046

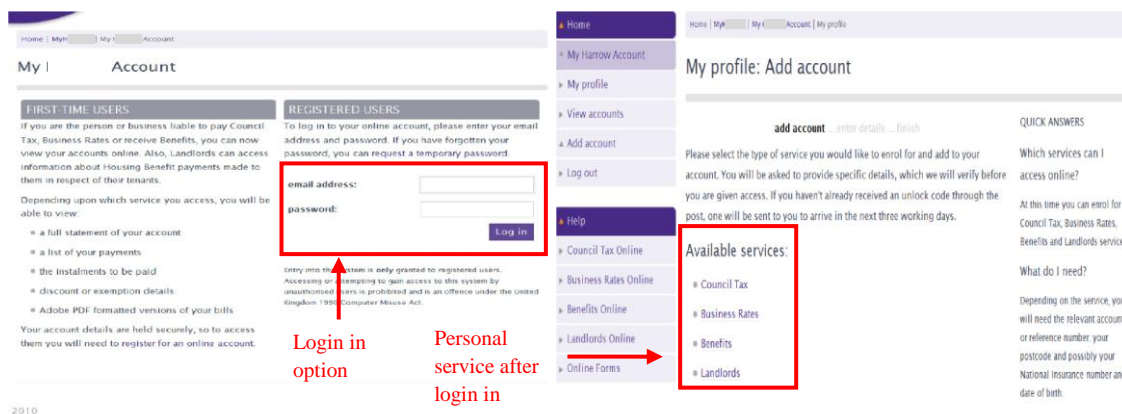
Moreover, Table 5.13 shows all the credibility strengths detected in London Authority 1. Among these credibility strengths, the most significant one is that the URLs properly present the domain name of London Authority 1. For instance, URL on each page is clearly presented by “http://www. London Authority 1.gov.uk”. The URL is used to specify the resource address on the World Wide Web. It generally starts with the protocol specification and ends with the domain name. The correct URL ensures the correct access to the corresponding website, which is regarded as a visual

reference to decipher information source (Nielsen, 2000). As such, the proper URL indication of London Authority 1 may help users to validate the resource location, so that users can easily judge whether information and services retrieved are provided by the relevant physical government organization.

The next credibility strength found in London Authority 1 is that the content of the site matches with information users expect to obtain from a local council. For example, a range of services, such as council tax, housing advice and building control, provide relevant and detailed information to meet users' needs. Content design is a key component in determining website usage (Huizingh, 2000). It requires offering quality information and services to indicate the real government organisation working behind the site. When users get to the site, they look in the main content area of the site and want to know what the content is about. If they find that the content fits their expectations, they may take the further action within the site. Therefore, the feature that the content matches with information users expect may encourage users' service involvement within London Authority 1.

Another credibility strength identified in London Authority 1 is that some personal services are protected by a password. For example, when users track the progress of a single person council tax discount application, a login mechanism is required on the site (see Figure 5.3). Private information and services on e-government need to be protected (Al-Omari and Al-Omari, 2006), so that only authorized users gain access to the information. A login requirement is used as a common protection mechanism for user authentication, which ensures such information and services safety (Vu et al., 2007) and reduces users' perception of risk. As such, the credibility feature of users' personal services being protected by a password increases services security, which may encourage users' engagement with information exchange and online services transaction within London Authority 1.

Figure 5.3 Personal services protection by password in London Authority 1



London Authority 2

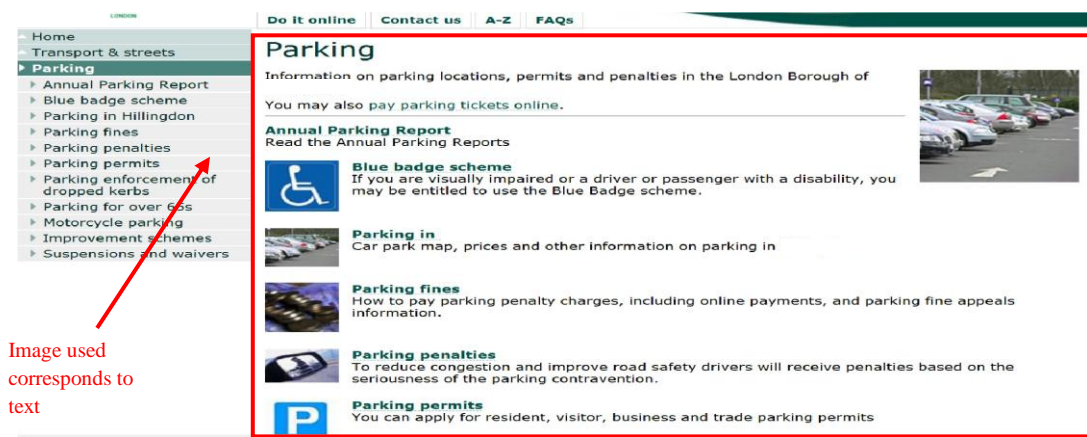
With respect to London Authority 2, a number of usability and credibility strengths have been detected. Table 5.14 presents all the usability strengths found in London Authority 2 (see Appendix 8b for the detailed one-sample T-test results). As shown in Table 5.14, the most significant usability strength identified is that the links used are all working properly, with no broken links within the site. Hyperlinks are used to connect the texts, pages and documents of the site. They serve as navigational functions that guide users to move from one place to another to locate the target object. As indicated by Nielsen (2000), the basic user interaction is to click on links to go through huge information spaces to identify information. Therefore, making all links accessible reduces the barriers to information connection, which ensures users free movement around the site when searching for their target information.

Table 5.14 Usability strengths in London Authority 2

Usability strengths	Mean (Std. deviation)
The options/links used are all working properly.	4.25 (0.452)
Significance	T=7.123, P=0.000
Each image corresponds to each context.	4.17 (0.577)
Significance	T=5.080, P=0.000
Users can move forward and backward within different fields of the site.	4.00 (0.853)
Significance	T=2.762, P=0.018
A title with every page clearly indicates the subject of the content.	3.92 (0.793)
Significance	T=2.607, P=0.024
The site's functionality supports users to complete most tasks.	3.75 (0.452)
Significance	T=3.294, P=0.007

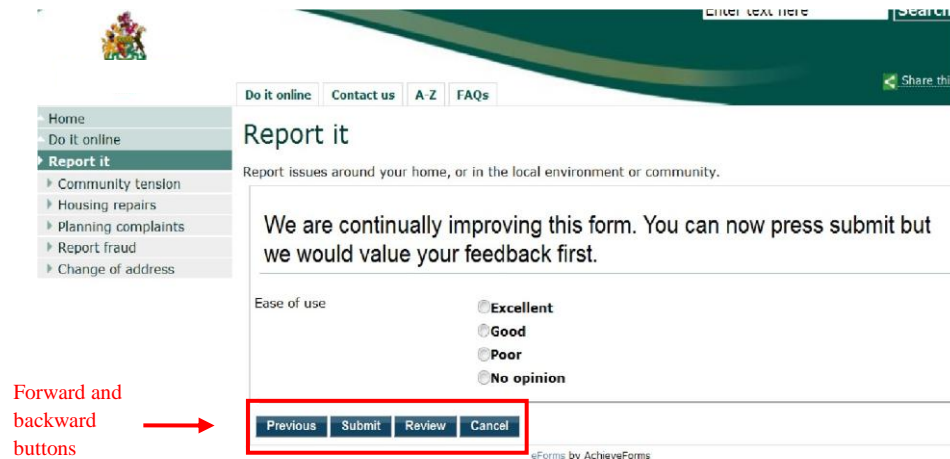
The next usability strength identified in London Authority 2 is that the images used correspond to relevant context (see Figure 5.4). Images are used to support graphic design. With proper content-related image utilization, it can facilitate text presentation and increase the site's visual communication. Marsico and Levialdi (2004) indicated that, using images related to content provides cognitive support, which can lighten the cognitive load and speed up interaction. Thus, the usability strength that the images used in London Authority 2 correspond to relevant context supports content presentation, so that users can quickly capture and understand subject content information presented on the site.

Figure 5.4 Images with context in London Authority 2



Additionally, a usability strength found in London Authority 2 is the easy forward and backward movement within the different fields of the site. For example, when users complete online forms, the next and review buttons are clearly presented to support going forward and backward (see Figure 5.5). As indicated before, the provision of forward and backward function is used to strengthen the site orientation, which increases users' navigational control to move around the site to identify the target object. Lemahieu (2002) showed that forward and backward navigation buttons are very efficient means for navigating, which helps users' efficiency of information searching (Tung et al., 2003). Consequently, the usability strength that users can easily move forward and backward within the different fields of London Authority 2 may increase the site navigation, so that users can easily guide their movement around the site to find the target information.

Figure 5.5 Easy forward and backward movements in London Authority 2



In addition, a usability strength detected in London Authority 2 is that a title on every page clearly indicates the subject of the content. A page title is used as the page reference, which represents and specifies the page's subject content. When users look for information on the pages, they usually scan the subject content rather than reading information in detail (Morkes and Nielsen, 1998). In this context, the page title is used as the content indicator to support subject content scanning and judgment. With concise page titles, users can quickly locate relevant information to meet their needs. Therefore, the usability strength of a page title clearly indicating the subject content helps users in information identification, which may result in faster and more efficient information processing.

Furthermore, a usability strength identified in London Authority 2 is that the site's functionality supports users to complete most tasks. For example, the site provides multiple service approaches, including a services directory, quick access, hierarchical menu and search engine to fit with users' different skills in the tasks completion. Multiple service approaches are used to build the site's functionality, which provides users with freedom of control and flexible navigation. As such, users can carry out tasks according to their preference. As indicated by Bai et al. (2008), since the site's functionality supports users' service activity, their satisfaction rises. Therefore, the usability feature that the site's functionality supports users to complete most tasks may increase users' satisfaction with London Authority 2.

Table 5.15 Credibility strengths in London Authority 2

Credibility strengths	Mean (Std. deviation)
The content of the site matches with information user expect to obtain from a local council.	4.08 (0.515)
Significance	T=4.328, P=0.001
The site does not present too many irrelevant promotion contents.	4.00 (0.739)
Significance	T=2.627, P=0.024
The URL properly presents the domain name of the local council.	3.83 (0.577)
Significance	T=2.360, P=0.038

There are also a number of credibility strengths that have been found in London Authority 2 and they are presented in Table 5.15 (see Appendix 8b for the detailed one-sample T-test results). Among these credibility strengths, the most significant credibility strength identified is that the content of the site matches with information users expect to obtain from the local council. For example, a wide range of government services, such as education, health and social care are offered with detailed information to meet users' requirements. Content is the foremost website design guideline (Nielsen, 2000), which requires providing quality information and services to indicate the real government organisation working behind the site. When users get to the site, they always look at the content first and make quick judgments about what the site is about. If they find that the content fits with their expectations, they may continue with further tasks within the site. Therefore, the credibility feature that the content matches with users expectations may encourage users' services engagement within London Authority 2.

Furthermore, a credibility strength identified in London Authority 2 is that limited promotional content is presented on the site. Promotional content is online advertisement that delivers commercial messages for business purposes. Such promotional content needs to be restricted on the site because too many adverts can be distracting for users, and lead to the consideration of the commercial implications of the site (Sillence et al., 2006). As such, with limited promotional content presentation on London Authority 2, users can easily distinguish information from advertisement content, and keep their concentration on the subject information during information seeking.

Additionally, a credibility strength detected in London Authority 2 is that the URL appropriately presents the domain name of the local council. For example, each

page's URL in London Authority 2 starts with "http://www.London Authority 2.gov.uk". The URL is commonly used to specify the resource address on the World Wide Web. It generally consists of the protocol specification and the domain name. The correct URL ensures correct access to the website, therefore it is regarded as a visual reference to decipher the information source (Nielsen, 2000). As such, the proper indication of the URL on London Authority 2 may help users to validate the resource location, so that they can quickly match and judge whether information and services retrieved are offered by the relevant physical government organization.

London Authority 3

Based on the one-sample T-test, there are a number of usability and credibility strengths that have been found in London Authority 3 (see Appendix 8c for the detailed one-sample T-test results). Table 5.16 reveals all the usability strengths identified in London Authority 3. Among them, the most significant usability strengths identified are the consistent display format cross the pages, and the provision of multiple service approaches for tasks completion. The consistent display format is used to establish the consistent layout, strengthening visual unity throughout the e-government website. It visually helps users understand that the information arranged is presented in the same way across the pages. As indicated by Tractinsky et al. (2006), a consistent website increases aesthetics expression, which affects users' cognitive reactions and usage patterns throughout the website. As such, the usability feature of the consistent display format in London Authority 3 may help users' understanding of information presentation, so that they may quickly follow the consistent display to locate the information to meet their needs. Another most significant usability strength is the provision of multiple service approaches for tasks completion. Multiple service approaches, such as a services directory, quick access and search engines, are used to support the site's functionality, which provides users with freedom of control and flexible navigation. These functions can help users conduct tasks in their preferred way. As indicated by Bai et al. (2008), since the site's functionality supports users' service activity, users' satisfaction raises. Therefore, the usability feature that the site's functionality supports users to complete most tasks may increase users' satisfaction with London Authority 3.

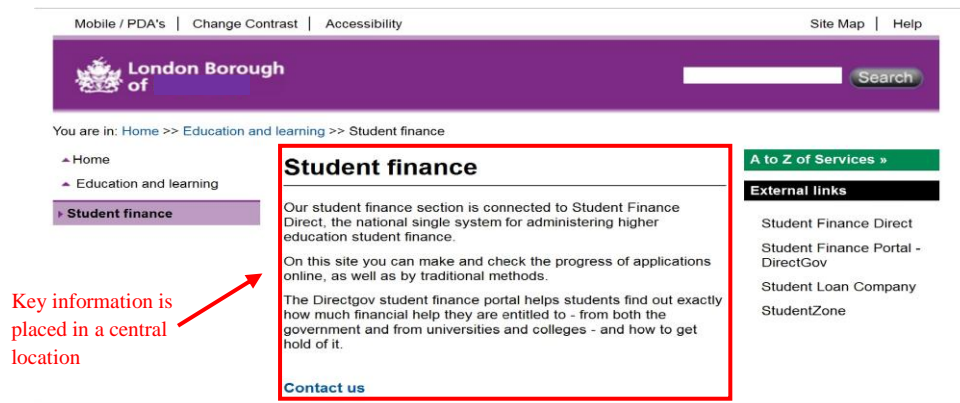
Table 5.16 Usability strengths in London Authority 3

Usability strengths	Mean (Std. deviation)
Each page is always followed the same display format.	4.67 (0.492)
Significance	T=5.816, P=0.000
The site' functionality supports users to complete most tasks.	4.67 (0.492)
Significance	T=5.816, P=0.000
A title on every page clearly indicates the subject of the content.	4.58 (0.669)
Significance	T=3.852, P=0.003
Key information/subject is placed in a central location on the page.	4.50 (0.674)
Significance	T=3.391, P=0.006
It is easy to operate the e-government website.	4.42 (0.669)
Significance	T=2.988, P=0.012
It is quick to change the particular data in a previous section so users do not need to retype all the data when they go back.	4.42 (0.793)
Significance	T=2.519, P=0.029
Users can move forward and backward within the site.	4.25 (0.622)
Significance	T=2.285, P=0.043

In addition, a usability strength found in London Authority 3 is that a title on every page clearly indicates the subject of the content. A page title is used as the page reference, which represents and specifies the page's subject content. When searching for information through the site, users usually scan the subject content rather than reading information words by words (Morkes and Nielsen, 1998). In this regards, the page title acts as an indicator for users in scanning the subject content. With concise page titles, users can quickly capture the subject information of the pages and locate relevant information to meet their needs. Therefore, the usability feature of a page title clearly indicating the subject content helps users in information identification, which may result in faster and more efficient information seeking.

Moreover, a usability strength identified in London Authority 3 is that the key information/subject is placed in a central location on the page (see Figure 5.6). Central location is a focal point where it is used to emphasise the key element of a page. Since information/subject is presented in such a location, it makes the information/subject stand out and controls the users' gaze, drawing attention to the main area of the page. Hence, users may quickly get the important information/subject.

Figure 5.6 Key information location in London Authority 3



Another usability strength found in London Authority 3 is that the e-government website is easy to operate. For example, users can simply type key words in the search engine within the site to locate the target information. Furthermore, the site provides users with clear instructions in support of online service transactions. Ease of operation refers to ease of use, in which users can easily use a variety of functions within the site to achieve their service goal. It influences users' service performance and subjective satisfaction. As indicated by Hung et al. (2006), users' attitude and performance toward e-government services is determined by the site' ease of use, which in turn, affects users' acceptance of e-government websites. As a result, features of the site ease of operation supports the site utilization, so that users can easily use the site to achieve their desirable service outcomes.

The next usability strength detected in London Authority 3 is that users can quickly change the particular data in the previous section without retyping all the data when they go back. For example, during completing of the online complaint form, users can quickly change the errors in the previous pages without retyping data in other fields (see Figure 5.7). Changing the specific errors without influencing other data is used to help users recognize and recover data from errors. It can attract users' attention on particular fields of errors and help them in error recovery. Meanwhile, it can also reduce the chances that users make new errors when they retype data in other fields. As such, when a specific piece of information is in error, users can quickly concentrate on the error field and correct the errors, which may lead to effective error recovery in London Authority 3.

Figure 5.7 Changing particular data in previous section without retyping all data in London Authority 3

Furthermore, a usability strength found in London Authority 3 is that users can easily move forward and backward within the site. For example, during information seeking, the breadcrumbs bar and the multiple menu levels allow easily accessible to the previous and following pages (see Figure 5.8). The provision of forward and backward function is used to strengthen site orientation, which supports users' navigational control to move around the site to locate target information. As indicated by Lemahieu (2002), moving forward and backward function is a very efficient way for navigating, which helps users' efficiency in information seeking (Tung et al., 2003). Accordingly, easy moving forward and backward within London Authority 3 may improve the site navigation, so that users may easily guide their movement to find the target information.

Figure 5.8 Easy forward and backward movements in London Authority 3

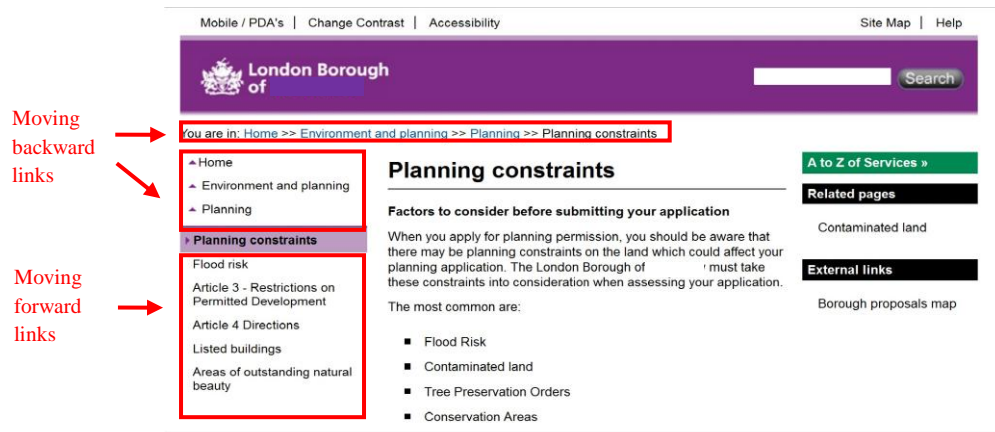


Table 5.17 Credibility strengths in London Authority 3

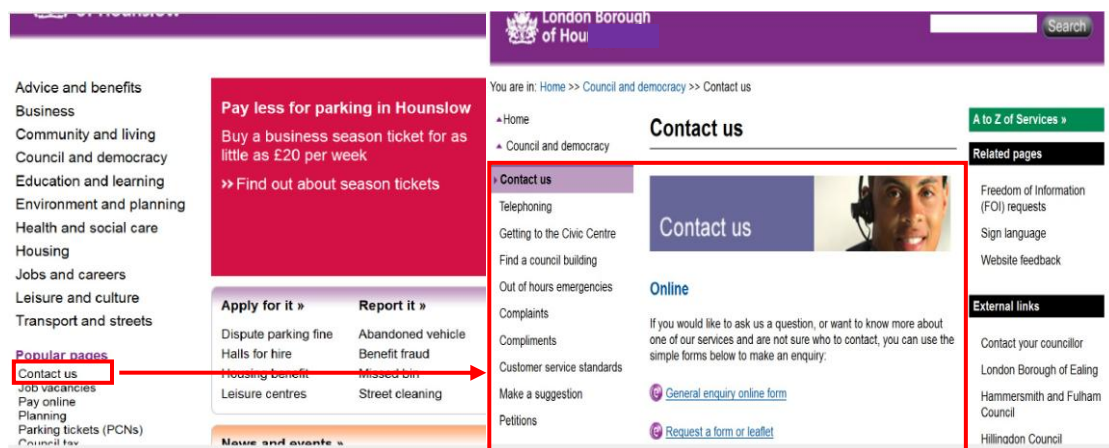
Credibility strengths	Mean (Std. deviation)
The site does not present too much irrelevant promotional content.	4.92 (0.289)
Significance	T=12.320, P=0.000
The URL properly presents the domain name of the local council.	4.83 (0.389)
Significance	T=8.395, P=0.000
The "Contact" option has been clearly indicated.	4.75 (0.452)
Significance	T=6.587, P=0.000
A postal address for the local council offices clearly presents on the site.	4.67 (0.492)
Significance	T=5.464, P=0.000
Information presented in a page matches the names of the categories.	4.58 (0.669)
Significance	T=3.592, P=0.004
Users can quickly start their tasks because site is easy to use.	4.58 (0.793)
Significance	T=3.029, P=0.011
Information presented on the site can encourage users to believe in the reliability of the local council.	4.50 (0.674)
Significance	T=3.134, P=0.010

The results of the one-sample T-test also indicate a number of credibility strengths in London Authority 3 (see Appendix 8c for the detailed one-sample T-test results). As shown in Table 5.17, among these credibility strengths, the most significant one is that there is not too much irrelevant promotional content in London Authority 3. As described, promotional content is used to deliver commercial adverts for business purposes. Such promotional content needs to be limited, since too many adverts can be distracting for users. Thus, with limited presentation of promotional content in London Authority 3, users may easily distinguish information from advertising content, and keep their focus on the subject information during information seeking.

Furthermore, a credibility strength found in London Authority 3 is that the URL properly presents the domain name of the local council. For example, each pages' URL clearly indicates "http://www.London Authority 3.gov.uk". The URL is used to specify the resource address on the World Wide Web. It generally consists of the protocol specification and the domain name. The correct URL ensures correct access to the website and is regarded as a visual reference to decipher the information source (Nielsen, 2000). As such, with the proper indication of the URL on London Authority 3, users may gain access to corresponding website and easily validate the resource location. In particular, it may support users' judgment about whether information and services retrieved are supplied by relevant government organization as expected.

Another credibility strength identified in London Authority 3 is that the “contact us” option is clearly indicated on the e-government website (see Figure 5.9). The contact option is used to link contact details, including telephone number, feedback form and email address. It serves for quick access to e-government contact information for users. As indicated by Kappel et al. (2006), the provision of contact information can strengthen users' confidence in a vendor's reliability. Therefore, with availability of the contact information on London Authority 3, it clearly delivers the message that the e-government is ready and welcome to be contacted by users whenever they need, which may be beneficial for users to develop trustworthiness in the site.

Figure 5.9 Contact option indication in London Authority 3



The feature of presenting a physical address of the local council on pages is the next credibility strength identified in London Authority 3. A physical address is used to indicate a location in the real world. With the provision of the physical address on the e-government website, it attempts to reveal that the site is legitimate, which is helpful to build real-world presence on the site (Sidi and Junaini, 2006). In addition, the indication of the physical address is a structural feature of the website, which provides information about the quality of the site and influences trust development (Rains and Karmikel, 2009). Thus, with the clear presence of the physical address on London Authority 3, it supports users to match the e-government website with the real world, which may be helpful to build trust in the site.

The next credibility strength detected in London Authority 3 is that information presented in a page matches with the names of the categories. Category name is used

to represent the category subject content, which can give users a preview of where the subject information will lead to. If category name clearly indicates relevant subject information, users can easily know what they will get before going to the detailed information. Therefore, information presented on a page matching with the name of the categories can support subject content cognition and identification, so that users may spend less time going through the levels of information to locate the target in a subject searching process.

Another credibility strength found in London Authority 3 is that users can quickly start their tasks because the site is easy to use. For example, the site offers shortcuts to services access that arranges all online services in alphabetical order, so that users can easily locate and access the target service quickly. In addition, subject options are named meaningfully, which is easy for users to understand and so select the options through multiple menu levels. Ease of use is used to describe how users can easily employ a variety of functions within the site to achieve their target goal. It can influence users' interaction with the services and subjective satisfaction. As indicated by Hung et al. (2006), users' attitude and performance toward e-government services is largely dependent on the site' ease of use, which can determine users' acceptance of the e-government website. Accordingly, the feature of the site's ease of use may increase users' performance efficiency as in London Authority 3.

Additionally, a credibility strength detected in London Authority 3 is that information presented on the site can encourage users to believe in the reliability of the local council. For example, online news reports are complete, precise and reflect official information about the events that took place around the local council. Information relevancy, completeness and authority are used to establish information quality (Magoutas and Mentzas, 2010). With quality information, users' trust and satisfaction with e-government raises. As indicated by Eschenfelder and Miller (2007), when quality information is provided on government website, it can facilitate a desired relationship between users and government organization. As such, the credibility feature that information presented on London Authority 3 can encourage users to believe in the reliability of the local council may influence the relationship between users and the local council, which is helpful to build long term trust.

5.3.1.3 Users' perception of usability and credibility problems

Having presented and discussed the usability and credibility strengths identified in each London Authority, this section aims to indicate users' perception of the usability and credibility problems in three London Authorities. Similarly, in order to identify the usability and credibility problems, a one-sample T-test is used to determine whether there is a significant difference between the specific usability and credibility feature perceived and the perception of overall usability and credibility in each target e-government website respectively. If a significant difference is found, the usability feature with a mean score less than the overall usability mean score is selected as a usability problem. Equally, the credibility feature with a mean score less than the overall credibility mean score is selected as a credibility problem. Moreover, among the usability and credibility problems detected, a lower mean score indicates a more serious problem. In this way, a number of usability and credibility problems have been identified in each target e-government website. Tables 5.18, 5.19, 5.20, 5.21, 5.22 and 5.23 show all the usability and credibility problems found in London Authority 1, 2 and 3 respectively. The following sub-sections describe and discuss these usability and credibility problems in detail.

London Authority 1

According to the one-sample T-test results, there are a number of usability and credibility problems that have been found in London Authority 1. Table 5.18 shows all the usability problems identified in London Authority 1 (see Appendix 8a for the detailed one-sample T-test results). As shown in Table 5.18, among the usability problems, the most serious usability problem is that users are confused by links that have many different colours. For instance, regarding the quick online service links, the payment service is presented in red, the report service is displayed in yellow, the application service is indicated in blue and the search service is shown in purple (see Figure 5.10). Link colour is used to indicate different resources within the site. An appropriate number of link colours can visually support users to distinguish the resource differences, so that target information can be easily located to meet users' needs. As indicated by Kappel et al. (2006), users with limited colour vision can quickly recognize the difference among subjects. On the contrary, links with many

different colours may visually influence the site's appearance and obstruct users colour vision, which may result in difficulty and confusion in information identification, such as during information the searching process in London Authority 1.

Figure 5.10 Links with many different colours in London Authority 1



Table 5.18 Usability problems in London Authority 1

Usability problems	Mean (Std. deviation)
Users are confused by links that have many different colours.	2.32 (1.084)
Significance	T=-3.303, P=0.007
Online help function is not clearly indicated on the website.	2.33 (1.155)
Significance	T=-3.350, P=0.006
It is difficult to switch between online help and current work.	2.75 (0.866)
Significance	T=-2.800, P=0.017

In addition, a usability problem identified in London Authority 1 is that the online help function is not clearly indicated on the website. Online help is used to aid users' usage of the site, answering frequent questions and guiding them to relevant sections of the site. It can provide users with reference information, advice and instructions when users have trouble finding information or using services on the site. Since such help information can be clearly indicated, it develops users' ability to solve problems encountered on the site. Therefore, the online help function is regarded as a more realistic approach to make site easier to use (Brinck et al., 2002). Conversely, the problem of the online help function not being clearly indicated on the site influences the user support information identification, so that users may face the challenge of solving problems as in London Authority 1.

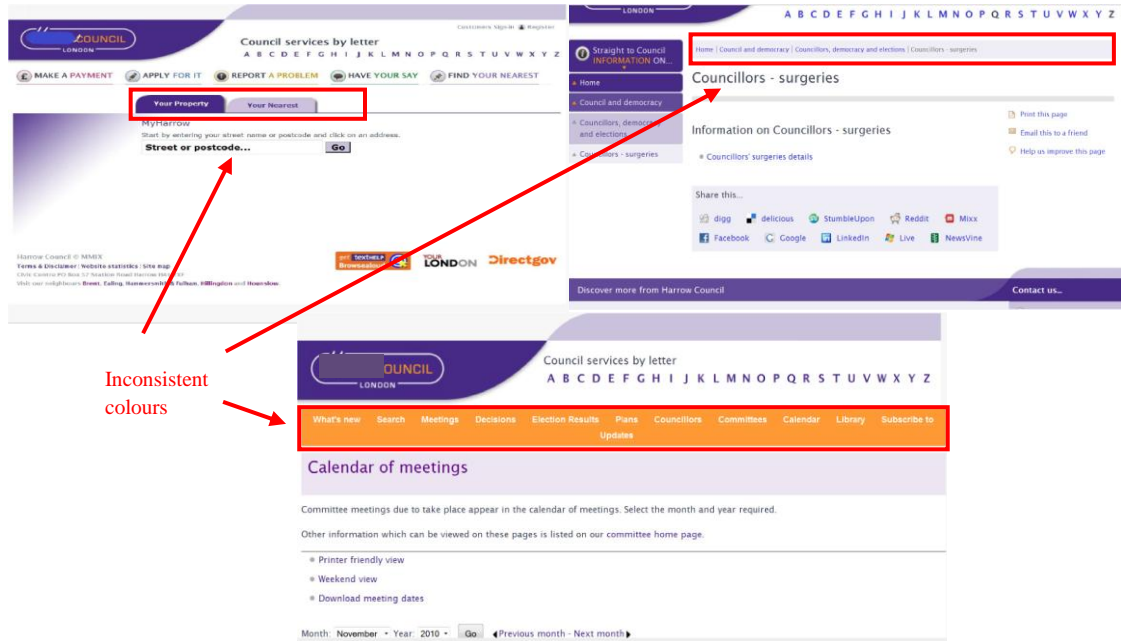
Another usability problem found in London Authority 1 is that it is difficult to switch between online help and current work. For example, the current work window is replaced by the online help window when users click the online help option. However, after users finish online help, it is hard to retrieve the previous work. Ease of switching between online help and current work is used to ensure that help information can be easily reviewed in order to support users in task completion. As such, users want to be able to conduct their work and review online help information whenever they need. However, the difficulty of switching between online help and current work hampers the task completion process, so that users may have to spend more time and memory to get back to their previous work after using online help information.

Table 5.19 Credibility problems in London Authority 1

Credibility problems	Mean (Std. deviation)
Information is presented without consistent colours.	2.58 (0.996)
Significance	T=-3.883, P=0.003

Furthermore, the credibility problem in London Authority 1 has been found and it is presented in Table 6.19. The credibility problem identified is that information is presented without consistent colours. For example, options on the menu bar are normally presented in black with a blue background. However, in the subpage about council meetings, options on the menu bar are presented differently, which has a white font with a yellow background (see Figure 5.11). Colour consistency is used to establish unity across pages of the e-government website, strengthening visual subject recognition and reducing layout clutter. It helps users understand that information visually provided is organised and presented in the same way throughout the site. As such, after the initial experience with the site, consistent colours usage enables users to easily locate information to meet their needs. As indicated by Ozok and Salvendy (2001), consistent colours form an important part of overall web consistency, which may lead to better user performance and lower error rates. Conversely, failure of information presentation with consistent colours may affect visual continuity of the site, which may cause users difficulties in searching information through London Authority 1.

Figure 5.11 Information presentation without consistent colours in London Authority 1



London Authority 2

Based on the results of the one-sample T-test, there are a number of usability and credibility problems that have been found in London Authority 2. Table 5.20 presents all the usability problems found in London Authority 2 (see Appendix 8b for the detailed one-sample T-test results). As shown in Table 5.20, among these usability problems, the most serious problem found is that the options on the home page are not clearly enough presented for meeting users. For example, an “A-Z” option is too ambiguous to indicate its subject and a “Do it online” option is repeatedly used on the home page (see Figure 5.12). Users’ subject recognition would be better supported by having clearly presented more understandable options. It can simplify the content presentation and improve its readability. As such, it can help users to quickly understand the subject presented on pages and easily select the relevant option to obtain their expected information. However, options without clear presentation can lead to page content complexity. As indicated by Tuch et al. (2009), a starting page with high complexity makes users less pleasurable and users perform worse on search and recognition subjects on such pages. Therefore, the problem of the subject options not being clearly presented on the home page of London Authority 2 affects subject content presentation, which may cause users difficulty with information seeking.

Figure 5.12 Ambiguous and repeated options in London Authority 2



Table 5.20 Usability problems in London Authority 2

Usability problems	Mean (Std. deviation)
Some options on the home page are not clearly presented.	2.17 (1.030)
Significance	T=-3.879, P=0.003
Users are confused by links that have many different colours.	2.25 (0.866)
Significance	T=-4.280, P=0.001
The site sometimes does not indicate a task's progress.	2.33 (0.888)
Significance	T=-3.851, P=0.003
Links already visited are not clearly marked.	2.50 (1.243)
Significance	T=-2.285, P=0.043
The site allows users to skip over the order of the process.	2.67 (0.778)
Significance	T=-2.907, P=0.014

Additionally, a usability problem identified in London Authority 2 is that users are confused by links that have many different colours. As indicated before, link colour is applied to show different resources within the site. Links with the appropriate number of colours can visually help users distinguish the resources so as to easily identify relevant subject information. As indicated by Kappel et al. (2006), users with limited colour vision can quickly recognize the differences among subject content. In contrast, links with many different colours can visually hamper users' resource recognition, which may make it more difficult for users to locate information during information searching process.

Moreover, a usability problem detected in London Authority 2 is that the site sometimes does not indicate a task's progress. For example, when users complete and submit the online report form, there is no message to indicate the task progress (see Figure 5.13). The indication of task progress is used to help users through two main functions: presenting the total task steps that need to be completed and informing

users how many steps have been done and how many steps are left. As such, users can easily monitor their task progress and measure task completion situation. However, the absence of presenting the task progress may influence task completion process transparency, so that users may find it difficult to locate their task step during the task process.

Figure 5.13 Lack of task progress in London Authority 2

Another usability problem identified in London Authority 2 is that the links already visited are not clearly marked. Marking visited links is used to support users' ability to distinguish which parts of the site they have already visited and which parts remain to be explored. It can help users in information searching. As indicated by Nielsen, (2000), visited links that have been clearly marked can provide users' sense of structure and location in the site and help users quickly find subject information. Nevertheless, when visited links are not clearly marked as within London Authority 2, it can weaken navigational recognition, so that users may waste time visiting the same place repeatedly, or even give up their searching purpose prematurely.

Finally, a usability problem found in London Authority 2 is that the site allows users to skip over an order of the process. For example, when completing the vehicle crossing online form, users can jump to the final section of the form and submit it without providing the necessary information in previous pages. An order of the process refers to a sequence of pages, which provides a linear experience for users (Brinck et al., 2002). In this linear experience, users are required going through a set of pages in order, in order to ensure that all necessary information that the site

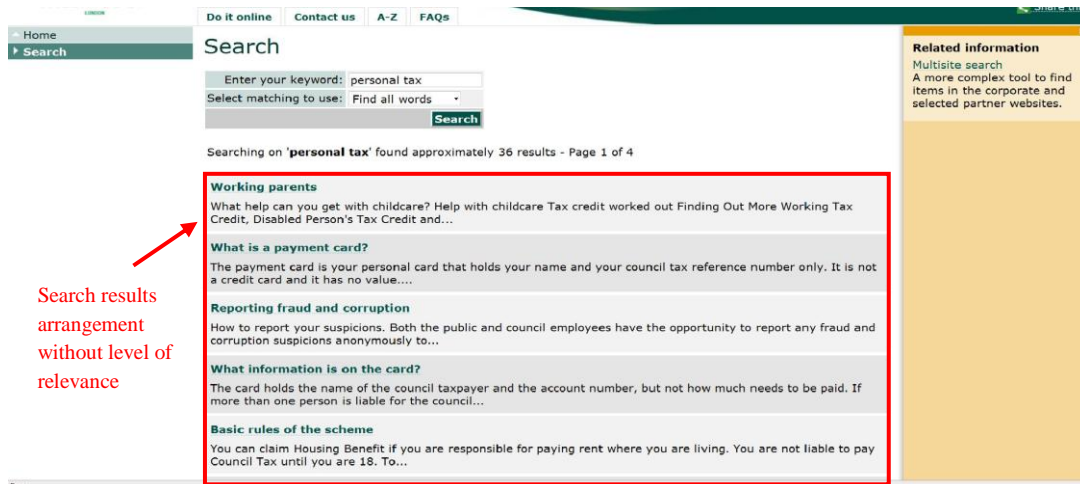
requires is provided. In particular, within an online service procedure, each page is dependent on information gathered from previous pages. As such, following the order of the process can prevent users from making mistakes, such as missing data. On the contrary, when the site allows users to skip over an order of the process, the sequence of pages is broken, which may increase the error rate, or even result in failure of task completion as in London Authority 2.

Table 5.21 Credibility problems in London Authority 2

Credibility problems	Mean (Std. deviation)
Search results are not organised by the level of relevance.	2.43 (0.937)
Significance	T=-2.242, P=0.047
Content is displayed without consistent layout.	2.67 (0.985)
Significance	T=-2.720, P=0.020
There is no clear security message when users access some confidential information.	2.92 (0.515)
Significance	T=-3.521, P=0.005

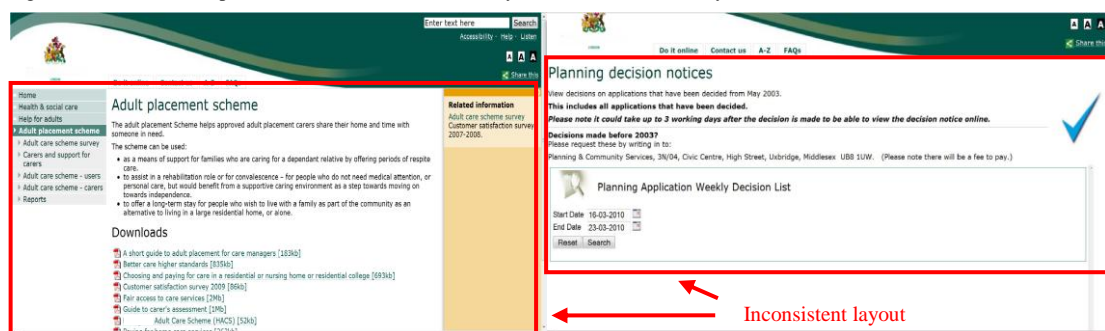
Furthermore, a set of the credibility problems in London Authority 2 have been also found and all the credibility problems are presented in Table 5.21 (see Appendix 8b for the detailed one-sample T-test results). As shown in Table 5.21, the problem with highest seriousness is that search results are not organised by the level of relevance. For example, when users type the key words of “personal tax” in the search engine box, the search engine lists a result relating to working parents prior to a result relating to a single person’s tax discount form (see Figure 5.14). Search results need to be arranged in a logical order, which places the best hits at the top (Nielsen, 2000), so that users can quickly scan the results and easily identify their target. The level of relevance is commonly used as the logical sequence for search results arrangement. It can help users build sound understanding of the search results organisation. As indicated by Brinck et al. (2002), search results arrangement shown with the level of relevance enables users to easily locate items and reduces memory load problems. In contrast, failure to organize search results by level of relevance influences search engine capability, so that users may face the challenge of determining and choosing relevant items from a large number of search results.

Figure 5.14 Search results without level of relevance arrangement in London Authority 2



Another credibility problem found in London Authority 2 is that the content is displayed without a consistent layout. For example, generally, subject content is presented in the central space with a navigation bar on the left side of page and additional information on the right side of page. However, on the planning decision notices page, content is presented differently, whereby only subject content is displayed (see Figure 5.15). Layout consistency is used to visually build unity throughout the e-government website. It supports users subject recognition, indicating that information organised is presented in the same way. As such, when users interact with the site, a consistent layout enables users to quickly understand information arrangement and easily find information to fit their needs. As indicated by Brinck et al. (2002), a consistent layout aids user navigation and synthesizes the elements on the pages, which decreases learning time associated with navigating the site. Conversely, failure of information display with a consistent layout may affect visual continuity of the site, which may lead to difficulty in searching information in London Authority 2.

Figure 5.15 Information presentation without consistent layout in London Authority 2



Finally, a credibility problem identified in London Authority 2 is that there is no clear security message when users access certain confidential information. For instance, when users access the primary schools admission online form, there is no message to indicate that users' personal information is protected. Private information and services on e-government need to be protected (Al-Omari and Al-Omari, 2006), and inform users during online transaction processes. A security message is used as the notice that informs users about personal information safety and reliability. As such, it can reduce users' perception of risk. As indicated by Bélanger and Carter (2008), users' perception of risk can hamper users' intentions to transact online services on e-government. Consequently, the absence of the security message when users access confidential services may affect the site's reliability, so that users may worry about private information safety, and even decrease their intentions to interact with online services within the e-government website.

London Authority 3

Based on the results of the one-sample T-test, a number of usability and credibility problems in London Authority 3 have been identified and presented in Tables 5.22 and 5.23 respectively (see Appendix 8c for the detailed one-sample T-test results). As shown in Table 5.22, among all the usability problems identified, the most serious problem found is that users are confused by links that have many different colours. For example, on the council tax page, some links are shown in black, some links are displayed in blue and other links are indicated in white (see Figure 5.16). Link colour is used to present different resources within the site. Links with limited colours can visually help users distinguish between the resources so as to easily identify relevant subject information. As indicated by Kappel et al. (2006), users with limited colour vision can quickly recognise the differences among subjects. In contrast, failure to provide limited link colours can visually influence resource recognition, so that users may feel it difficult to locate target information among subject content.

Figure 5.16 Links with many different colours in London Authority 3

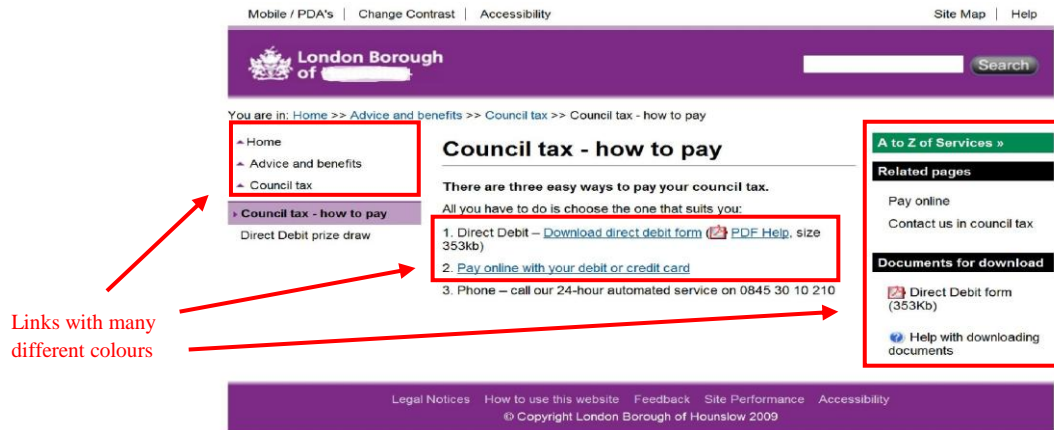
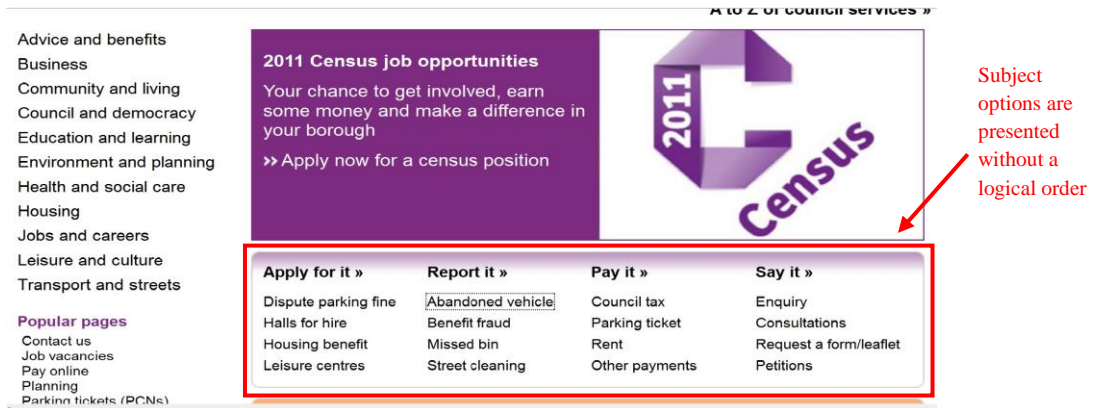


Table 5.22 Usability problems in London Authority 3

Usability problems	Mean (Std. deviation)
Users are confused by links that have many different colours.	2.58 (0.669)
Significance	T=-6.511, P=0.000
Subject categories are presented without a logical order.	2.83 (1.030)
Significance	T=-3.386, P=0.006
Links already visited are not clearly marked.	2.92 (1.084)
Significance	T=-2.952, P=0.013
Information is unbalanced between breadth and depth.	3.00 (0.853)
Significance	T=-3.412, P=0.006

Another usability problem detected in London Authority 3 is that subject categories are presented without a logical order. For example, the quick services categories on the home page are randomly displayed (see Figure 5.17). A logical order of subjects is used to indicate a sequence of information organization, which supports users having a sensible way to scan subject information. It assists users' understanding of the overall subject arrangement and reduces memory load problems. As suggested by Brinck et al. (2002), when topics are arranged with a particular order, users are able to easily locate items; remember items of interest viewed previously and access primary information quickly. On the contrary, when subject categories are presented without a logical order as in London Authority 3, users may feel it difficult to scan and find target subjects among the categories on the site.

Figure 5.17 Category options arrangement without a logical order in London Authority 3



The next usability problem identified in London Authority 3 is that links already visited are not clearly marked. Marking visited links is used to support users' ability to distinguish which parts of the site they have already visited and which parts remain to be explored. As such, it can help users to locate information during information searching. As indicated by Nielsen (2000), visited links that have been clearly marked can provide users with a sense of structure and location in the site and enable users to quickly find the subject information. However, failure to mark visited links can weaken navigational recognition, which may result in users visiting the same place repeatedly, or even abandoning their searching purpose prematurely as in London Authority 3.

Finally, a usability problem found in London Authority 3 is that the information arrangement is out of balance between breadth and depth. For example, in order to find information about free school meals, users have to select a link from 50 options within the page of school and colleges. On the other hand, when locating specific information about student financial assistance, users need to pass through 5 levels of information depth on the site (see Figure 5.18). Breadth and depth are used to distribute e-government content by designing a number of subject categories and a number of information levels. A medium condition of breadth and depth is considered as an optimal trade-off, which can help information retrieval (Larson and Czerwinski, 1998). It is because the appropriate number of categories displayed can keep content from getting cluttered and reduce the chance that users are confused by a vast number of options (Jennifer, 1998). While, as the moderate levels of information is designed, it can avoid over-length subject information through site so that users can follow a

short path into the site in order to find the detailed information. However, as suggested by Larson and Czerwinski (1998), unbalanced breadth and depth can cause problems in information acquisition. In such conditions, users are frustrated by increasing levels of depth or feeling lost in content space, when there are a large numbers of categories. As such, the problem that information arrangement is out of the balance between breadth and depth in London Authority 3 may cause more difficulties and errors for users searching for available information resources on a page and locating detailed information through multiple information levels.

Figure 5.18 Breadth and depth balance in information arrangement in London Authority 3

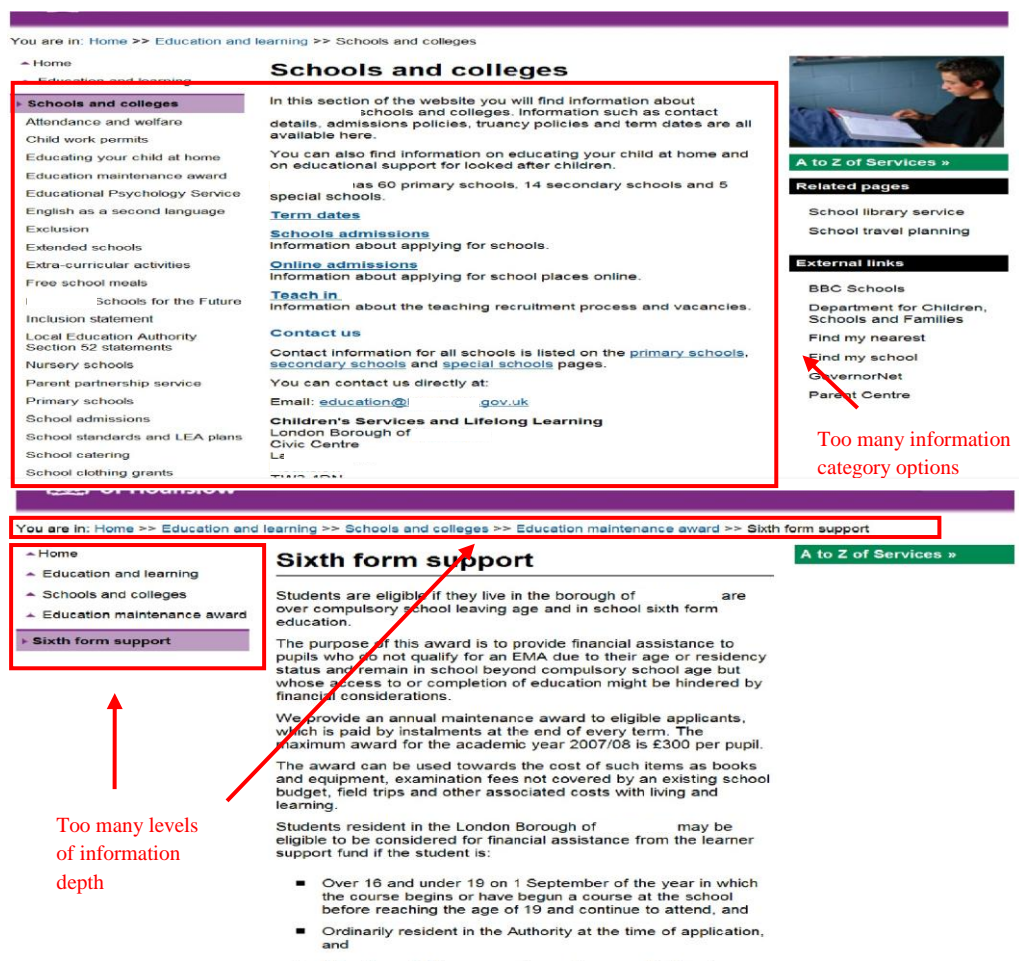


Table 5.23 Credibility problems in London Authority 3

Credibility problems	Mean (Std. deviation)
Detailed contact information has not been organised by different departments of the council.	2.75 (0.866)
Significance	T=-4.560, P=0.001
It is not clear to see the site's credentials because the site does not display awards it has earned.	2.75 (0.754)
Significance	T=-5.239, P=0.000
The site does not provide a shortcut option for access to information about the local council.	3.08 (0.996)

Significance	T=-2.805, P=0.017
There is no clear secure message when users access some confidential information.	3.08 (0.515)
Significance	T=-5.427, P=0.000
It is not clear to indicate how much users have done and how much remains when completing tasks.	3.17 (0.937)
Significance	T=-2.673, P=0.022
The information about the site update is not clearly presented.	3.17 (1.030)
Significance	T=-2.433, P=0.033
It is difficult to see a sign-in option when users access some personal services.	3.17 (0.937)
Significance	T=-2.673, P=0.022

Furthermore, a set of the credibility problems in London Authority 3 have been also identified and presented in Table 5.23. Among all the credibility problems, the problem with highest severity is that the detailed contact information is not organised by different departments of the council (see Figure 5.19). Arranging contact information by departments is used to represent an order of information organisation. It can provide users with a logical way to search contact information. As such, it increases users' understanding of information arrangements and reduces memory load problems. On the contrary, when detailed contact information is not arranged by different departments, users may feel it is difficult to locate target contact details to meet their needs as in London Authority 3.

Figure 5.19 Contact presentation without department organisation in London Authority 3

The screenshot shows a 'Contact us' page with a navigation menu on the left. The main content area is divided into 'Online' and 'Telephone' sections. The 'Telephone' section is highlighted with a red box, and a red arrow points to it from a red text annotation: "Detailed contact information is organised by different departments".

The next credibility problem found in London Authority 3 is that the awards, such as web or Internet standard awards, won by an e-government website are not displayed properly. Displaying awards won by e-governments is useful for enhancing its reputation. In particular, it can build a positive reputation since the nature of awards is

only positive (Whitmeyer, 2000). As addressed by Resnick et al. (2000), reputation promotes the formation of trust. Therefore, the problem that the awards won by London Authority 3 are not displayed clearly may affect its reputation, which in turn, may lead to lower user trust.

Furthermore, a credibility problem detected in London Authority 3 is that it is hard to find the local council quick access information. The provision of information about local council is used to introduce e-government in terms of history, missions and services. It provides users with an opportunity to know that there are real people and real government organisations working behind the site. As a result, it can develop users' trust. However, where the information about local council becomes difficult to see, it may obstruct the delivery of real world feel, so that users may be challenging to develop their trust with the site.

Another credibility problem identified in London Authority 3 is that there is no clear security message when users access some confidential information. For instance, when users access the online complaint form, there is no security message to indicate how users' personal information is protected. Private information and services on e-government need to be protected (Al-Omari and Al-Omari, 2006), and such protection needs to be notified to users. A security message is used as the notice that informs users about personal information safety. As such, it can reduce users' perception of risk. As indicated by Bélanger and Carter (2008), users' perception of risk can hamper their intentions to exchange information on e-government. Therefore, the absence of the security message when users access confidential services may affect building reliability, so that users may be concerned about the safety of private information, or even fail to engage in online services as in London Authority 3.

In addition, a credibility problem found in London Authority 3 is that it is not clear to see how much users have done and how much was left to complete the task. For example, when users complete the abandoned vehicle form, there is no message to indicate task progress within the site (see Figure 5.20). The indication of task progress is used to support users' task completion process on the site. It can help users accomplish their tasks, performing two main functions: presenting the total task steps that need to be completed and informing users how many steps have been done and

how many steps remain. As such, users can understand the overall task process and easily monitor it. However, the lack of the task progress indication may influence task completion and reduce task process transparency, so that users may feel it is difficult to capture their task movement within the site.

Figure 5.20 Lack of message to indicate task progress in London Authority 3

The figure shows two side-by-side screenshots of web forms from London Authority 3. The left form is titled "Report an Abandoned Vehicle" and the right is "Reporting a problem with streets/public places". Both forms lack progress indicators.

Report an Abandoned Vehicle

You are in: Home >> Online Forms

Use this e-form to report a problem abandoned vehicles including problems that have an adverse effect on your environment. We will only investigate incidents that have occurred on Hounslow Council owned land.

Fields marked with * are mandatory

When a calendar icon is displayed you may click on this to enter a date. Dates must be entered as DD/MM/YYYY.

A questionmark can be clicked on to provide help on the question

Problem type*:

Untaxed vehicles should be reported to the DVLA by calling 0800 0325 202 or via their website DVLA.gov.uk

Is vehicle damaged and/or dangerous? Yes No

Approximately how long has the vehicle been abandoned?

Vehicle registration*

Make*

Model*

Reporting a problem with streets/public places

You are in: Home >> Online Forms

Please check and confirm that the details you have entered are correctly displayed below

At the bottom of the page, click "Submit" to complete the request or click "Back" to change any details you have entered.

Problem type:

Please enter details of the problem (250 characters maximum)

Location details

Street name (nearest)

Town

Your details

Preferred contact method

Telephone Number

Additionally, a credibility problem identified in London Authority 3 is that information about the site update is not clearly presented. For example, the most recent updated date for specific content is not clearly indicated. Site update is used to maintain information and services of e-government regularly and keep them up-to-date. All updated information needs to be clearly presented through visual cues on the e-government websites. A recently updated date is regarded as a key visual cue offering significant reference, which helps users to determine the quality of information received. As suggested by Brinck et al. (2002), the last update date indicates regular attention to the site. Such an indication is beneficial for those who can judge whether information or services obtained are current. Therefore, the problem of the updated date not being explicitly presented in London Authority 3 may cover up its information quality and result in users facing challenges in judging the reliability and accuracy of information and services obtained from London Authority 3.

Finally, a credibility problem detected in London Authority 3 is that it is difficult to see a log-in option when users access some personal services. For instance, online submission for library card application is accessible without a password requirement. Private information and services on e-government need to be protected (Al-Omari and

Al-Omari, 2006), so that only authorized users can gain access to the information. Password allocation is used as a common protection mechanism for user authentication, which ensures such information and services safety (Vu et al., 2007). Meanwhile, it can reduce users' perception of risk. Bélanger and Carter (2008) found that users' perception of risk can limit their interaction with e-government, especially users' intentions to exchange information and transact online services. As such, the problem of access to confidential services without a password requirement increases the risk of personal information loss as in London Authority 3, which may result in the user failing to engage in any private services on the e-government website.

5.3.2 Users' perception: qualitative data

Apart from quantitative data of users' perception through the closed questions of the questionnaire, qualitative data is also collected during the experiment through the open-ended questions to support the questionnaire results. These aim to gain an insight into the participants' thoughts about usability and credibility. In the open-ended questions, the participants are encouraged to indicate their further considerations under the broad headings of: the successful and weak features of usability; and the successful and weak features of credibility. This section reports the findings in these areas for each target London Authority. However, in order to avoid unnecessary duplication of previously described usability and credibility features, this section details the usability and credibility successful and weak features that are outside the scope of the usability and credibility strengths and problems identified by the quantitative analysis.

London Authority 1

Based on the frequently recorded features in terms of usability and credibility in London Authority 1, some common successful and weak features emerge from the open-ended questions and these are presented in Tables 5.24 and 5.25 respectively. As shown in Table 5.24, among the successful features of usability, those that are not indicated by quantitative data, are the provision of clear text formatting and use of simple language. Text formatting is used to manage text within the site in terms of

font, font size and style sheets. Clear text formatting strengthens text presentation and facilitates information readability. The following quotes indicate the participants' responses regarding text formatting:

"I found that text font and font size are comfortable in the site."

"Font and text size are all right and white space used is helpful to read the text between the lines."

"The clear style and format are used in each page; they help me to look for information through the site."

In addition, writing content in simple language is used to make information easy to read. It can assist users' subject understanding and reduce cognitive load. As such, users can quickly process information and locate relevant information to meet their needs. The following quotes show the participants' thoughts about this feature:

"The system uses simple language, so it is easy to read information."

"I can easy to see categories because simple and clear information is presented at the home page."

"The information is easy to read."

Table 5.24 Successful and weak usability features in London Authority 1

Successful features
Clear layout design
Provision of A-Z services function
Clear text formatting
Use of simple language
Weak features
Overloaded information
Weak search engine function
Link with many colours

On the other hand, among the usability weaknesses (see Table 5.24), the features that are outside the scope of the usability problems identified by quantitative data include overloaded information and the weak search engine function. The appropriate amount of information presentation is used to keep content from getting cluttered, so that users can easily read information and quickly locate the subject. Meanwhile, memory load problems can also be reduced. However, when excessive information is presented on the site, it increases the content display burden, which may lead to users

feeling frustration in reading information from the large amount of subject content. The following quotes show the participants' responses regarding overloaded information feature:

- “It is very likely to get lost by giving a lot of options on the page.”
- “There are too many links/categories, so that I could not choose the relevant options.”
- “There is too much information presented at the same time.”
- “The home page is cluttered and I do not know where to start my job.”
- “The home page lacks of focus.”

Another weak usability feature is that the search function does not fully support the searching purpose. The search engine is used to retrieve information. A high search capability can generate precise, comprehensive and relevant search results, which can help users easily locate the target object. Conversely, the search engine with weak searching capability influences the search effectiveness, so that users may feel it is difficult to find useful information to meet their search requirements. The following quotes present the participants' comments regarding weak search engine feature:

- “Advanced search does not necessarily give me the right answer.”
- “The search engine on the top is not working well.”
- “The search results are not clear to identify relevant information.”

Table 5.25 Successful and weak credibility features in London Authority 1

Successful features
Provision of quality information
Log-in protection
Provision of mandatory field in online forms
Weak features
Lack of images
Absence of multi-language support

Table 5.25 presents the frequently recorded successful and weak credibility features in London Authority 1. In terms of successful features, one feature that is outside the scope of the credibility strengths found by quantitative data is the provision of mandatory fields in online forms. A mandatory field refers to a compulsory answer, which requires users to provide necessary information that the site needs. Once information in these mandatory fields meets the site's requirements, then users are

allowed to move to the next step. As such, it can prevent users from making errors, such as missing data when they fill in online forms. The following quotes present the participants' responses regarding this feature:

“The mandatory field in the online form ensure the answers are given.”

“I like that the form require mandatory answers, because it would not allow me jumping the process without providing necessary answers.”

In terms of the weak credibility features in London Authority 1, the features that are outside the scope of the credibility problems found by quantitative data are the lack of image usage and the absence of multi-language support (see Table 5.25). Images are used to establish visual communication. They can aesthetically strengthen page layout and facilitate content presentation. Conversely, the lack of images may affect information presentation, so that users may easily lose their interest in reading pure text on the screen. The following quotes present the participants' responses regarding the lack of images:

“Relevant pictures are only shown on the home page, but there is no picture on other pages.”

“There are not relevant pictures with text when I read information on other sub-pages.”

“In some pages, only text is presented.”

Another weak credibility feature is that the site does not provide multi-language support. Language support is used to build the site's accessibility. It can translate a specific page from English into the users' preferred language, so that users with different language requirements are able to conduct their task on the same e-government website. However, the absence of multi-language support function may hamper the access to the e-government website, so that users with language requirements may face a challenge when interacting with e-government services. The following quotes from the participants' responses illustrate this weakness:

“Only English is available, it should provide multiple-language supports.”

“The site should have language translation function in accessibility.”

“Language support is missing, sometimes I need language translation.”

London Authority 2

According to the frequently recorded features in terms of usability and credibility in London Authority 2, some common successful and weak features emerge from the open-ended questions and these are indicated in Tables 5.26 and 5.27 respectively. As shown in Table 5.26, among the successful usability features, the feature that is not mentioned by quantitative data is the provision of clear contact details. Contact information is used to build communication with users, indicating that there are real people and a real organization working behind the site and they are ready for users to contact them. As such, it can strengthen users' confidence in the site's reliability. The following quotes show the participants' responses about this feature:

“I like that the contacts details is always visible on the bottom of each page.”

“It is easy to find and use ‘contact us’ option in the system.”

“It would be easy to contact them because different contact methods are available on the site.”

“The contact detail is available on the site, which makes me trust this government website.”

Table 5.26 Successful and weak usability features in London Authority 2

Successful features
Relevant pictures usage
Provision of clear contact information
No broken links
Weak features
Excessive text presentation
Poor search engine capability
Lack of navigational tools
Lack of progress indication

On the other hand, the weak usability features that are outside the scope of the usability problems identified by quantitative data are the excessive text presentation and the poor searching capability (see Table 5.26). A proper amount of text presentation is used to keep content uncluttered, which can help content readability and accelerate users' information processing. In contrast, excessive text display makes the page content cluttered, which may result in a heavy burden on users' readability. The following quotes present the participants' responses regarding this feature:

“Sometime, a lot of texts are shown on the screen.”

“The information of texts presented on the site are cluttered, therefore I lost my attention on them.”

“There are too many texts on some pages.”

“Some pages display too many texts to read.”

“In some pages, too much information is displayed, so I could not find which one is what I want.”

Another weak usability feature is the poor search engine capability. A search engine is used to help information retrieval. With a high search engine capability, it can generate comprehensive and relevant search results, supporting users to quickly locate the target information. On the contrary, a low search engine capability influences search effectiveness, which may lead to complexity of information identification. The following quotes indicate the participants' thoughts about poor search engine capability issue:

“The search facility does not always pick up all the key words.”

“The search engine does not list the items in the level of importance.”

“I found that search box does not always find the information.”

“The results searched by search engine have not been sorted by a category.”

“The search function cannot be operated to find some information.”

Table 5.27 Successful and weak credibility features in London Authority 2

Successful features
Provision of council staff photos
Relevant content presentation
weak features
Lack of security messages
Too many categories presented on some pages

Table 5.27 shows the frequently recorded successful and weak credibility features in London Authority 2. In terms of the successful features, the feature that is outside the scope of the credibility strengths found by the quantitative analysis is the provision of council staff photos. The provision of staff photos is used to convey a real-world feel to users (Fogg et al., 2001), which can indicate the existence of people who are responsible for services on the site. Accordingly, it promotes the formation of trust (Collins, 2006). The following quotes reveal participants' responses regarding provision of staff photos:

“I like the factor that the council logo and staff photos are easy to see.”

“I can see a lot of staff photos on the site.”

“It is good idea to present people photos on the site, so that I feel close to them.”

In terms of the weak credibility features, the feature that is not indicated by quantitative data is that too many categories are presented on some pages. Subject category is commonly used to structure e-government information. The appropriate number of categories can keep content from getting cluttered and reduce the chance that users are confused by a vast number of options. Nevertheless, too many categories cause problems in information acquisition (Nielsen, 2000), so that users may find it hard to identify appropriate information in a large number of categories. The following quotes indicate the participants' responses relating to excessive categories issue:

“I could not find the specific information because there are too many options on the page.”

“There is excessive information indicated on some pages.”

“Sometimes, the information is allocated in a large number of categories.”

London Authority 3

Based on the frequently recorded features in terms of usability and credibility in London Authority 3, some common successful and weak features emerge from the open-ended questions and these are presented in Tables 5.28 and 5.29 respectively. As shown in Table 5.28, among the successful usability features, the feature that is outside the scope of usability strengths detected by quantitative data is the provision of useful navigational tools. Navigation is the process of determining the movement around an environment, orienting at each step where to go (Jul and Furnas, 1997). Navigational tools aid users in finding the particular object and navigating through the site with three functions: indicating how information on the site is organized; helping users to get to information needed and informing users where they have been and where they are (McDonald and Stevenson, 1998). Therefore, with useful navigational tools, it provides users with flexible routes through the site and supports their information retrieval, especially affecting users' orientation and search efficiency. The

following quotes indicate the participants' responses regarding navigational tools feature:

"I like the breadcrumb on the site, so I can clearly see my current position at all time."

"The navigation bar is visually labelled to indicate the hierarchic menu relationship."

"Site map is useful to see subject content arrangement in the site."

"The site clearly navigates me to find the information."

Table 5.28 Successful and weak usability features in London Authority 3

Successful features
Provision of multiple functions to support task completion
Provision of useful navigational tools
Working links within the sites
Consistent layout
Weak features
Categories arrangement without order
Lack of multi-language support

On the other hand, the weak usability feature that is outside the scope of the usability problems identified by the quantitative analysis is the lack of multi-language support. Multi-language support is used to improve the site's accessibility, offering function for users to choose their preferred language to support their activities within the site. However, the lack of multi-language support can affect access to the e-government website, which results in users difficulties in interacting with the site. The following quotes reveal the participants' responses relating to the lack of multi-language support issue:

"I think that it would be inconvenient for foreigners if only English language is available on the site."

"I cannot change display of language even when different language icons are shown on the site."

Table 5.29 Successful and weak credibility features in London Authority 3

Successful features
Correct URL
Content writing without aggressive words
Weak features
Lack of updated information
Absence of services feedback

Regarding credibility in London Authority 3, Table 5.29 presents the frequently recorded successful and weak features through the open-ended questions on the questionnaire. In terms of successful features, the feature that is outside the scope of the credibility strengths found by quantitative data is content writing without aggressive words. Writing content in a friendly style is used to build effective content communication. It ensures that the words used in the content are comfortable for users and shows the site's respect for them. As such, users may be pleased to read content and accept information. The following quotes reveal the participants' responses relating to this credibility feature:

“The words used in the site are respectful.”

“There are no aggressive information and advertisements on the site.”

In terms of the weak credibility features in London Authority 3, the feature that is not indicated by the quantitative analysis is the absence of services feedback. Services feedback is used to indicate users' experience regarding the services performed on the e-government website. It provides an opportunity for users to review the services in order to improve service transparency and users' perception of the service effectiveness. However, the absence of services feedback may affect users' understanding of the target services, which may obstruct services effectiveness judgments. The following quotes indicate the participants' responses regarding the absence of services feedback provision:

“The system did not indicate the responses of the complaint related to the public.”

“Users' feedback about council services via such system has not been provided.”

5.4 Users' performance

Having described the participants' perception of usability and credibility for each e-government website evaluated, in order to investigate whether the participants' perception of usability and credibility influences their performance, users' performance with the target e-government websites is measured when the participants perform a set of practical tasks. These practical tasks cover a range of e-government

services categories, including information distribution, products and services offered and user participation. For example, in terms of information distribution, the tasks require the participants searching for specific information and news; in terms of products and services, the participants are asked to download documents and search for job; in terms of user participation, the tasks involve the participants paying taxes and applying for a school position online (see Appendixes 1a-1c for the detailed tasks). Such tasks are representative activities that users would be expected to carry out on an e-government website. This task performance is analysed on the basis of a set of performance data, including the amount of online help required; time spent completing tasks; number of steps to finish tasks and number of successful tasks completion. By focusing on such criteria, it is helpful to measure the level of users' interaction with the target e-government websites when they perform a set of tasks. Tables 5.30, 5.31 and 5.32 show the results of users' task performance with each London Authorities 1, 2 and 3 respectively.

Table 5.30 Users' performance with London Authority 1 in experiment 1

London Authority 1	Online help required		Number of steps to complete the task		Successful task completion		Time spent for the task	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Task 1	0.000	0.000	6.330	2.839	1.170	0.389	2.693	1.333
Task 2	0.000	0.000	7.750	5.011	1.080	0.289	2.588	2.317
Task 3	0.000	0.000	4.500	4.739	1.080	0.289	1.471	1.290
Task 4	0.000	0.000	4.920	2.575	1.000	0.000	1.344	0.822
Task 5	0.000	0.000	3.580	1.564	1.080	0.289	1.293	0.717
Task 6	0.000	0.000	6.250	2.179	1.000	0.000	4.626	1.375
Task 7	0.080	0.289	5.830	3.834	1.580	0.515	2.362	2.102
Task 8	0.000	0.000	10.500	5.617	1.250	0.452	3.934	2.365
Task 9	0.170	0.389	10.750	3.494	1.000	0.000	6.317	2.184
Total tasks	0.250	0.452	60.417	13.104	1.139	0.117	26.627	8.905

Table 5.31 Users' performance with London Authority 2 in experiment 1

London Authority 2	Online help required		Number of steps to complete the task		Successful task completion		Time spent for the task	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Task 1	0.170	0.577	4.080	3.204	1.080	0.289	1.523	1.663
Task 2	0.000	0.000	4.420	1.929	1.000	0.000	1.428	0.717
Task 3	0.170	0.389	9.000	6.424	1.080	0.289	2.180	1.689
Task 4	0.000	0.000	4.750	4.288	1.000	0.000	0.920	0.724
Task 5	0.000	0.000	2.170	0.389	1.000	0.000	0.649	0.441
Task 6	0.170	0.389	22.170	11.769	1.750	0.452	4.518	2.575
Task 7	0.080	0.289	8.580	7.856	1.250	0.452	2.374	2.701

Task 8	0.000	0.000	9.920	2.778	1.000	0.000	4.398	1.318
Task 9	0.000	0.000	16.750	11.910	1.170	0.389	3.731	2.713
Total tasks	0.583	0.669	81.833	20.687	1.148	0.086	21.721	8.579

Table 5.32 Users' performance with London Authority 3 in experiment 1

London Authority 3	Online help required		Number of steps to complete the task		Successful task completion		Time spent for the task	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Task 1	0.000	0.000	5.500	3.177	1.170	0.389	1.964	1.721
Task 2	0.000	0.000	4.170	1.528	1.000	0.000	1.710	1.116
Task 3	0.000	0.000	5.750	3.545	1.000	0.000	1.898	1.311
Task 4	0.000	0.000	3.170	1.697	1.000	0.000	0.851	0.375
Task 5	0.000	0.000	2.830	1.801	1.080	0.289	0.720	0.545
Task 6	0.000	0.000	6.080	3.288	1.000	0.000	1.248	0.918
Task 7	0.000	0.000	3.500	2.236	1.000	0.000	1.153	0.706
Task 8	0.000	0.000	5.170	2.758	1.080	0.289	1.341	0.824
Task 9	0.000	0.000	14.00	11.794	1.250	0.452	5.323	5.005
Total tasks	0.000	0.000	50.167	16.297	1.065	0.088	4.474	0.019

In addition, table 5.33 presents results of the participants overall performance in the three London Authorities assessed. The results of the one-way ANOVA indicate that there is a significant difference in the participants' performance in terms of online help required for all tasks among the three London Authorities ($F=4.733$, $P=0.016$) (see Appendix 15 for the detailed one-way ANOVA results and Appendices 9a, 9b, 9c for the detailed performance results). More specifically, the participants in London Authority 2 required the most online help to complete all the tasks in the three target London Authorities. However, the participants in London Authority 3 required the least online help in all tasks completion among the three London Authorities evaluated.

In addition, the results of the one-way ANOVA reveal a significant difference in the participants' performance in terms of steps used for all tasks completion, which is also found among the three e-government websites measured ($F=10.862$, $P=0.000$). In detail, the participants who are in London Authority 2 took the most steps to finish all the tasks, while, the participants who are in London Authority 3 used the fewest steps in all task completion among the three target London Authorities.

Table 5.33 Overall users' performance in experiment 1

	London Authority 1	London Authority 2	London Authority 3
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	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
Online help required for all tasks	0.250	0.452	0.583	0.669	0.000	0.000
Significance	F=4.733, P=0.016					
	London Authority 1		London Authority 2		London Authority 3	
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
Number of steps to complete all tasks	60.417	13.104	81.833	20.687	50.167	16.297
Significance	F=10.862, P=0.000					
	London Authority 1		London Authority 2		London Authority 3	
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
Number of successful tasks completion	1.139	0.117	1.148	0.086	1.065	0.088
Significance	F=2.590, P=0.090					
	London Authority 1		London Authority 2		London Authority 3	
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
Time spent for all tasks (mins)	26.627	8.905	21.721	8.579	16.209	8.102
Significance	F=4.474, P=0.019					

However, the results of the one-way ANOVA indicate that there is no significant difference in the participants' performance in terms of number of successful tasks completion among the three e-government websites, although the results tend to indicate that the participants who are in London Authority 2 finished the fewest tasks, while the participants who are in London Authority 3 completed the most tasks.

These findings are also reflected in the results of the overall participants' perception of usability and credibility (see Tables 5.10 and 5.11), which indicate that London Authority 2 has the worst overall usability (Mean=3.323, Std. Deviation=0.367) and credibility assessment (Mean=3.436, Std. Deviation=0.322) out of the three target e-government websites. London Authority 3 has the best overall usability (Mean=3.843, Std. Deviation=0.275) and credibility assessment (Mean=3.885, Std. Deviation=0.291) among the three e-government websites evaluated.

Accordingly, this implies that there is a relationship between the participants' overall perception of usability and credibility and their performance. In other words, the overall participants' perception of usability and credibility may positively influence the participants' performance. In addition, as indicated by Fogg et al. (2003), the overall assessment is particularly affected by the problems with high severity, which,

in turn, have a larger impact on user perception. The usability and credibility problems with high severity found in London Authority 2 are that some options on the home page are not clearly presented and search results are not organised by the level of relevance. In other words, these problems may seriously affect the overall perception of usability and credibility of London Authority 2.

On the other hand, the results of the one-way ANOVA indicate that a significant difference in the participants' performance in terms of time spent completing all tasks is also detected among the three e-government websites measured ($F=4.474$, $P=0.019$). As presented in Table 5.30, the participants who are in London Authority 1 took longer to complete the tasks than those who are in London Authority 2 and 3. However, this is not reflected in the findings of the overall participants' perception of usability and credibility, which indicate that London Authority 1 is not the worst overall usability and credibility e-government website in the three e-government websites assessed. Based on these results, a possible explanation is that the participants' performance may be not only influenced by the overall perception of usability and credibility, but also affected by the particular perception of usability and credibility. The problems with highest severity found in London Authority 1 are that the links within the site use many different colours and subject information is presented without consistent colours, both of these problems are closely related to site look (see Tables 3.1 and 3.3, usability heuristic 8: aesthetic and minimalist design and credibility guideline 1: site looks professional). Site look is the set of visual design elements of e-government website, which has a considerable impact on users' perception of usability and credibility. Lavie and Tractinsky (2004) demonstrated that aesthetics is strongly correlated with perceived usability, which is a key determinant of users' satisfaction and pleasure. This is also supported by Tractinsky (1997), who found that system aesthetics can be seen as apparent usability, which is perceived more quickly than other attributes of usability. In terms of credibility, Fogg et al. (2003) identified that the most prominent issue found in credibility evaluation is site look, which can cause users the most concern about credibility. More importantly, users' judgments of credibility are initially based on site look. As suggested by Robins and Holmes (2008), the first impression of credibility comes from the site look, which results in a faster judgment of credibility compared with other credibility cognitive processes. As such, these may suggest that users' perception of the e-

government websites look may also influence their performance, especially in London Authority 1.

5.5 Summary and conclusion

The purpose of experiment 1 was to evaluate usability and credibility of the three target e-government websites in the UK. The results of users' perception in experiment 1 suggest that there is much room for current e-governments to improve their usability and credibility. In particular, with respect to usability, the most serious usability problems identified in the target e-government websites lie within the areas of "aesthetic and minimalist design", "recognition rather than recall" and "consistency and standards". For example, regarding aesthetic and minimalist design, the links within the site use many different colours. Regarding recognition rather than recall, some options on the home page are not clearly presented. Regarding consistency and standards, subject categories are always presented without a logical order. In terms of credibility, the credibility problems with highest severity lie within the areas of "site looks professional", "make site easy to use and useful" and "show the honest and trustworthy people behind the site". For instance, regarding the site professional look, information is presented without consistent colours. Regarding site ease of use and usefulness, search results are not organised by the level of relevance. Regarding showing the honest and trustworthy people behind the site, the detailed contact information has not been clearly organised by different council departments and it is not clear to see the e-government website's credentials. These problems suggest that usability and credibility have not been considered in adequate detail in current e-government website design. It can be argued that without addressing usability and credibility in sufficient detail to inform e-government website design, it still remains a challenging target for users' interaction with e-government.

In addition, the results of users' perception indicate that among the three target e-government websites, the one that has the best overall usability is associated with the best overall credibility, and vice versa. Similarly, the e-government website that has the worst overall usability is associated with the worst overall credibility among the three target e-government websites, and vice versa. Accordingly, this suggests that

usability and credibility have a close correlation. In other words, users' perception of usability and credibility may positively influence each other, which need to be considered as a whole in e-government development.

Furthermore, the results of users' performance in experiment 1 reveal that users have different levels of interaction with each target e-government website when they perform a set of the practical tasks. More significantly, the performance results imply that there is a relationship between users' perception of usability and credibility and their performance. In other words, users' perception of usability and credibility positively influences their performance with the e-government websites evaluated. In detail, users' performance is not only influenced by the overall users' perception of usability and credibility, but also affected by the particular perception of usability and credibility, such as the e-government website look.

Experiment 1 has evaluated usability and credibility of the three target e-government websites based on users' perception and their tasks performance. According to the evaluation, there are a number of usability and credibility problems that have been identified in each target London Authority. In order to improve usability and credibility of these target London Authorities to meet users' requirements, and promote users' interaction with the e-government websites evaluated, there is a need to provide the proposed design solutions regarding these usability and credibility problems found in experiment 1. As such, the next chapter presents the detailed design solutions for the identified usability and credibility problems for each target London Authority.

CHAPTER 6

PROPOSED DESIGN SOLUTIONS

6.1 Introduction

The findings presented in Chapter 5 indicate that there are a number of usability and credibility problems that have been identified in each target e-government website. These problems suggest that usability and credibility have not been considered in sufficient detail in e-government website design. Without addressing usability and credibility at the detailed level of e-government website design, the challenge of users' engagement with e-government may still remain. For the target e-government websites to be accepted and used by a wider range of users, these three evaluated e-government websites need to improve their usability and credibility. This is also supported by previous studies (e.g. Garcia et al., 2005), which indicated that improving the usability of e-government can enhance service effectiveness and users' satisfaction, so that it can enable more users' participation. Furthermore, the success of e-government is strongly influenced by highly credible e-government websites, which in turn, promotes user trust of government (Sidi and Junaini, 2006). Therefore, it is important to improve the identified usability and credibility problems in order to develop the usability and credibility of the target e-government websites. To achieve this goal, Chapter 6 proposes design solutions for the usability and credibility problems found in experiment 1 for each target London Authority. The purpose is to develop more usable and credible e-government websites that can meet the requirements of different users and so enhance their interaction with the e-government websites evaluated.

Therefore, this chapter starts with a description of the proposed design solutions in relation to the identified usability and credibility problems for London Authority 1 (section 6.2). Then, it presents the proposed design solutions regarding the detected usability and credibility problems for London Authority 2 (section 6.3) and London

Authority 3 respectively (section 6.4). Finally, a brief summary of this chapter follows in section 6.5.

6.2 Proposed design solutions for London Authority 1

Usability problem 1: Users are confused by links that have many different colours

The results show that one usability problem found in London Authority 1 is that users are confused by links that have many different colours. Link colour is used to indicate different resources. A limited number of link colours can visually support users distinguishing the resource differences and so quickly locate relevant information. However, links with many different colours obstruct subject recognition, so that users may feel it is difficult to search for information within the site. As a result, the suggestion would be that e-government websites should apply the minimum number of link colours that can support users' subject recognition. One proposed design solution is to reduce link colours used in London Authority 1. More specifically, some link colours are reduced and changed to purple, especially in the quick online service, since purple is the most frequently used link colour within the site. In addition, in order to keep this link colour scheme, such a change is consistently implemented through London Authority 1. In this way, it may make users comfortable with links across the pages and visually reduce the colour distraction during their information seeking.

Usability problem 2: Online help function is not clearly indicated on the website

Another usability problem identified in London Authority 1 is that it is difficult to see the online help function on the site. Online help is used to provide user support information, which can help users solve problems encountered on the site. Conversely, the problem of the online help function not being clearly presented on the site influences identification of help information, so that users may face the challenge of solving problems as in London Authority 1. This suggests that online help information should be clearly identifiable within the site, which will allow users to use it at all times. One proposed design solution is to provide an online help option on

every page of London Authority 1 linking user support information, and place such an online help option in a fixed location on each page. In this way, the online help function can be clearly presented on the site, which may help users quickly find and access user support information to solve problems whenever they need.

Usability problem 3: It is difficult to switch between online help and current work

The results indicate that the next usability problem identified in London Authority 1 is that it is difficult to switch between online help and current work. The ease of switching between online help and current work is used to ensure that user support information can be easily reviewed to assist users in their task completion. On the contrary, the difficulty of switching between online help and current work hampers the task completion, so that users may have to spend more time and memory on retrieving their previous work after using online help information. Therefore, designers of e-government websites should consider providing an approach that will allow users to easily switch between online help and their current work without confusion. One proposed design solution is to open online help information in a separate window when users click on the online help option. In this way, it enables users to read user support information in a different window without any changes to their current work. After using it, users can simply close the online help window, and go back to their work window.

Credibility problem 1: Information is presented without consistent colours

On the issue of credibility, the results reveal that the credibility problem found in London Authority 1 is that information is presented without consistent colours. As discussed (see section 5.3.1.3), colour consistency is used to establish unity across the pages of e-government websites, strengthening visual subject recognition and reducing layout clutter. It can help users easily locate information to meet their needs. On the contrary, failure to present information with consistent colours affects overall website consistency, which may cause users difficulty in information identification. Accordingly, the suggestion is that e-government websites should keep a consistent colour scheme. One proposed design solution is to use the same colours pattern to present information across the pages of London Authority 1.

6.3 Proposed design solutions for London Authority 2

Usability problem 1: Some options on the home page are not clearly presented

One usability problem detected in London Authority 2 is that some options on the home page are not clearly presented. Users' subject recognition would be better supported by having clearly presented more understandable options. It can help users quickly understand subject content presented on the page and easily select relevant options to locate their expected information. In contrast, subject options without clear presentation can lead to page complexity, which may make it difficult for users to search and recognise subject content. As such, designers of e-government websites should consider providing an approach that can improve users' understanding of the options presented on the home page. One proposed design solution is to provide additional brief information to explain each option presented on the home page. However, to avoid annoying users, this interpretation message only appears when users move the mouse over the option. In this way, users will be given further information to increase their understanding of the option subject.

Usability problem 2: Users are confused by links that have many different colours

The next usability problem found in London Authority 2 is that users are confused by links that have many different colours. Specific link colours are used to indicate different resources within the site. A limited number of link colours can help users quickly locate relevant information. Conversely, links with many different colours may hinder information seeking, so that users may find difficulty in recognizing information differences between subject options. Therefore, the suggestion would be that e-government websites should use the minimum number of link colours that will support users' subject recognition. One proposed design solution is to reduce the current number of link colours used within London Authority 2. In such a way, it can reduce the link colours visual burden, so that users are able to quickly search and process information presented on the site.

Usability problem 3: The site sometimes does not indicate a task's progress

Another usability problem identified in London Authority 2 is that the site sometime does not indicate a task's progress. As discussed previously (see section 5.3.1.3), the indication of the task progress helps users understand their task completion process in two ways: indicating the total steps to complete a task and informing users how much has been done and how much is left. As such, users can easily monitor their task progress and measure the overall task completion status. In contrast, the absence of presenting the task progress influences the task completion process, so that users may wonder about their task movement within the task process. Therefore, it suggests that e-government websites should keep users informed of the task process to increase service transparency. One proposed design solution is to provide users with visual cues to indicate the task progress. More specifically, these visual cues should not only present the total steps of the task, but also highlight the current step that users are engaged in. In this way, it will improve service transparency and help users determine their task progress more easily.

Usability problem 4: Links already visited are not clearly marked

Further usability problem found in London Authority 2 is that links already visited are not clearly marked. As indicated (see section 5.3.1.3), marking visited links is used to help users distinguish which parts of the site they have already visited and which parts remain to be explored, therefore users can increase their sense of structure and location in the site and quickly find target information. However, when visited links are not clearly marked, it may weaken the site's navigational recognition, so that users may spend more time visiting the same place repeatedly and be confused by the complexity of information identification. Therefore, designers of e-government websites should consider providing an approach that will help users easily recognise visited links within the site. One proposed design solution is to mark visited links in italics within London Authority 2. In this way, it increases the site's navigational recognition, so that users may quickly know the places where they have already visited and where they have not been before, which can support their information seeking.

Usability problem 5: The site allows users to skip over the order of the process

Additionally, a usability problem found in London Authority 2 is that the site allows users to skip over the order of the process. Following the order of the process ensures that information in each step is provided, which can prevent users from missing data. However, the problem of the site allowing users to skip over the order of the process may break the sequence of task processing, which may result in failure to complete the task. The suggestion is that e-government websites should provide an approach that does not allow users to move to the next step until the necessary information on the current step is provided. One proposed design solution is to offer mandatory fields on each step and require users to complete compulsory information that the site asks for. Furthermore, to address these mandatory fields for users, compulsory information is marked by red asterisks (*). If users jump over the steps without completing compulsory information, the reminder information will be presented in a message window. In this way, users will be asked to provide information that the site needs and follow the process in the correct order.

Credibility problem 1: Search results are not organised by the level of relevance

Regarding credibility problems, the results show that one problem found in London Authority 2 is that search results are not organised by the level of relevance. As indicated (see section 5.3.1.3), the level of relevance refers to a logical order of information arrangement, which supports users in building a sensible way to search subject information. However, search results without this level of relevance arrangement may influence users' understanding of subject information organisation, so that it may be difficult to locate relevant subjects. This suggests that e-government websites should organise search results in a logical order that will aid users when searching subjects. One proposed design solution is to organise search results in order of relevance. Additionally, such relevance levels should be highlighted by using visual cues, such as a five-star rating. In this way, users will easily understand the arrangement of search results, and quickly locate subject information.

Credibility problem 2: Content is displayed without consistent layout

The next credibility problem identified in London Authority 2 is that content is displayed without consistent layout. Consistent layout is used to build unity throughout the site, which supports users in information seeking. Conversely, failure to display information with consistent layout affects overall website consistency, which may lead to difficulty in information identification. Thus, this suggests using a consistent layout pattern to present information across pages of e-government websites. One proposed design solution is to apply the same layout scheme to each subpage of London Authority 2. In this way, it can visually help users understand that information is organised and presented in the same way throughout the site. After initial experience with the site, users can quickly locate target information.

Credibility problem 3: There is no clear security message when users access some confidential information

Finally, a credibility problem detected in London Authority 2 is that there is no clear security message when users access some confidential information. Private information and services on e-government website need to be protected, so that users may feel safe when they transfer personal information within the site. A security message is used to inform users about personal information safety, which is helpful for users to develop trust. However, failure to provide security messages may reduce the site's reliability, so that users may worry about losing private information throughout the site. Thus, this suggests that e-government websites should inform users about data protection when they access private services. One proposed design solution is to provide security messages, indicating that users' personal information will be treated safely and not be shared with any third-parties. To inform users, this security message will be presented once users access any private services provided on London Authority 2. In this way, it will increase the e-government website private services protection and reduce users' concern about losing personal information.

6.4 Proposed design solutions for London Authority 3

Usability problem 1: Users are confused by links that have many different colours

The results show that one usability problem found in London Authority 3 is that users are confused by links that have many different colours. Link colour is used to indicate different resources within the site. A limited number of link colours can visually help users distinguish resource differences so as to easily identify relevant subject information. Conversely, links with many different colours hamper resource recognition, which may result in users difficulty with information identification. As such, designers of e-government websites should consider applying the minimum number of link colours and support users' subject recognition during information seeking. One proposed design solution is to reduce link colours used in London Authority 3. In this way, it may reduce users colour visual confusion and visually support users when locating information objects.

Usability problem 2: Subject categories are presented without a logical order

Another usability problem found in London Authority 3 is that subject categories are presented without a logical order. A logical order is used to show a sequence of information arrangement, which helps users to be able to quickly scan subject information to identify objects and reduce memory load problems. Similarly, failure to present subject categories with the logical order hinders information arrangement, which may lead to complexity of information seeking. Accordingly, designers of e-government websites should consider organising subject categories in a particular order to support users identifying a sensible way to scan subject information. One proposed design solution is to arrange subject categories in an alphabetical order on each page of London Authority 3. In this way, users may quickly understand the overall subject arrangement and easily identify relevant information to meet their needs.

Usability problem 3: Links already visited are not clearly marked

The results show that one usability problem identified in London Authority 3 is that links already visited are not clearly marked. As discussed previously (see section 5.3.1.3), marking visited links is used to indicate which parts of the site users have already visited and which parts remain to be explored. It can help users build the sense of structure and location in the site, and navigate them quickly to their target information. However, when visited links are not clearly marked, it weakens the site's navigational recognition, so that users may very likely visit the same page repeatedly and have difficulty locating information. Therefore, designers of e-government websites should consider providing an approach that will help users recognise the unused and used links within the site during the information seeking process. One proposed design solution is to mark visited links in italics within London Authority 3. In this way, users can quickly distinguish the places they have visited before and guide their movement around the site to locate relevant subject information.

Usability problem 4: Users get lost due to being given too many choices during information seeking

Additionally, a usability problem detected in London Authority 3 is that users get lost due to being given too many choices during information seeking. The appropriate number of options can be used to keep content from getting cluttered and reduce the chance that users are confused by the large number of choices. Hence, it helps information retrieval. On the contrary, an excessive number of choices may cause difficulty in information acquisition (Nielsen, 2000), so that users may feel frustration when searching for information in a particular content space. Therefore, designers of e-government websites should consider providing an approach that will allow users to feel comfortable with the number of subject options. One proposed design solution is to design a drop-down menu for each subject category that visually hides its sub options. When users move the mouse to the subject category, a type of stretch sub list is used to present the various sub options associated with this subject category. In this way, the number of choices is visually reduced on the page, which is not only helpful in preventing content from getting cluttered, but also beneficial for users to read and locate information.

Credibility problem 1: Detailed contact information has not been organised by different departments of the council

With respect to credibility, the results show that one credibility problem found in London Authority 3 is that detailed contact information has not been organised by different departments of the council. Contact information arranged by different departments is used to present an order of information organisation, which provides users with a logical way to search contact information. Conversely, when detailed contact information is not arranged by different departments, it may make it difficult for users to search the specific contact information. As such, it suggests that detailed contact information should be organised by different departments and presented in a clear way that will support users searching for objects. One proposed design solution is to provide the contact details with two levels. In the first level, it provides general contact content with associated links to the detailed level of contact information. In the second level, the detailed contact information is organised by the different departments of the council. In this way, users can quickly read information and locate the target contact information to fit in their needs.

Credibility problem 2: It is not clear to see the site's credentials because the site does not display awards it has earned

The results reveal that another credibility problem detected in London Authority 3 is that any awards won by the e-government website are not clearly displayed. As discussed (see section 5.3.1.3), displaying awards won by an e-government organisation is useful for enhancing its reputation, which promotes users' trust. On the contrary, the problem of the site's credentials not being clearly presented may affect reputation presentation, which in turn, may lead to lower users' trust. As such, designers of e-government websites should consider presenting the reputation of e-government by using visual cues. One proposed design solution is to present the awards, such as web and Internet standard awards; best council awards won by London Authority 3 on the web pages, which may be helpful for users to develop long-term trust.

Credibility problem 3: The site does not provide a shortcut option for access to information about the local council

Furthermore, a credibility problem identified in London Authority 3 is that it is hard to find quick access to information about the local council. The provision of information about the local council is used to introduce e-government. It provides users with an opportunity to know that there are real people and an organization working behind the site. As such, it develops users' trust. Conversely, without easy access to such information, it may influence the delivery of a real world feel, so that it may be hard for users to develop their trust. Consequently, the suggestion is that e-government websites should provide a link that will support users to easily and quickly access information about the local council. One proposed design solution is to design a shortcut option on every page within the site, linking the information about the local council. In addition, in order to make such information to be easily found, this shortcut option is consistently located on a fixed place within London Authority 3. In this way, users may easily access local council information at all times, which is helpful for them to enhance trust.

Credibility problem 4: There is no clear security message when users access some confidential information

Moreover, the results indicate that one credibility problem found in London Authority 3 is that there is no clear security message when users access some confidential services. A security message is used to inform users about their personal information protection, which can increase users' perception of safety on the site. However, the absence of such security messages when users access confidential services may reduce the site's reliability, so that users may worry about losing private data and find it difficult to engage in online transaction services. Therefore, designers of e-government websites should inform users about data protection during the use of private services. One proposed design solution is to provide security messages, indicating that users' personal information will be treated safely and not be shared with any third-parties. Furthermore, in order to inform users timely, such a security message will be presented once users click any private services provided by London

Authority 3. In this way, it will help users understand their personal information protection and reduce any concerns about losing their personal information.

Credibility problem 5: It is not clear how much users have done and how much remains when completing tasks

Another credibility problem found in London Authority 3 is that it is not clear how much users have done and how much remains to do when completing tasks. As discussed (see section 5.3.1.3), task progress indications are used to support users task completion, presenting the total steps of the task and informing users about the current stage that they are engaged in. Conversely, the lack of task progress indications may influence task completion support, so that users may find it difficult to monitor their task movement within the site. Therefore, designers of e-government websites should consider improving the task progress transparency, which will allow users to easily review their task progress in the task process. One proposed design solution is to provide visual cues that indicate the total steps of the task and highlight the current stage that users have reached. In this way, users can easily review their task progress and quickly judge how much is left in their task completion.

Credibility problem 6: Information about the site update is not clearly presented

The next credibility problem identified in London Authority 3 is that the information about the site update is not clearly presented. Updated information is regarded as a significant reference, which helps users determine whether information and services obtained are current. On the contrary, the problem that the updated information is not explicitly presented in London Authority 3 may cover up information quality and result in users facing a challenge in deciding the level of reliability and accuracy of content on the site. As a result, this suggests that all updated information on e-government websites should be clearly presented. One proposed design solution is to present a recently updated date on every page of London Authority 3. In addition, in order to ensure that the updated date can be easily found by users, this updated date is placed in a fixed position across the pages. In this way, users will easily find the updated information and quickly judge how current the information is within the site.

Credibility problem 7: It is difficult to see a log-in option when users access some personal services

Additionally, the results show that the final credibility problem detected in London Authority 3 is that it is difficult to see a log-in option when users conduct some personal services. A sign-in option is a common protection mechanism for users' authentication, which ensures private information and services safety. This can reduce users' perception of risk. However, the problem of accessing confidential services without a sign-in requirement increases the risk of personal information and services, which may result in users failing to engage in services within the site. Therefore, designers of e-government websites should consider applying a log-in approach that will protect users when conducting personal services. One proposed design solution is to provide a sign-in/register option within the site. More specifically, when users access personal services, the site requires users to sign in or register services in the first place. After logging in to the site, it enables users to continue their service tasks. In this way, only authorized users gain access to private information and services, which can increase the security of the personal services.

6.5 Summary and conclusion

Having evaluated the usability and credibility of the three target e-government websites in experiment 1 (Chapter 5), the findings suggest that there is much room for the target e-government websites to improve both their usability and credibility. In particular, there are a number of specific usability and credibility problems that have been identified in each target London Authority (see Tables 6.1 and 6.2). These problems imply that usability and credibility have not been considered in adequate detail in current e-government website design. Without addressing usability and credibility in sufficient detail in e-government website design, it may still remain a challenge for users' engagement with e-government websites. Thus, there is a need to develop more usable and credible e-government websites that support users to achieve their desirable services outcomes. In this vein, this chapter describes a set of proposed design solutions regarding the usability and credibility problems found in experiment 1 for each target London Authority. These proposed design solutions can provide

concrete prescriptions for improving the identified usability and credibility problems in each evaluated e-government website. The purpose is to increase overall usability and credibility of the target e-government websites, which can meet with users' needs and enhance their interaction with the e-government websites evaluated.

Table 6.1 Usability problems and design solutions within three London Authorities

Usability problems and design solutions	LA 1	LA 2	LA 3
Problem: Users are confused by links that have many different colours. Solution: Link colours used within the target e-government websites are reduced.	√	√	√
Problem: Online help function is not clearly indicated on the website. Solution: An online help option is provided on every page of the e-government website linking user support information, and placed in a fixed location on each page.	√		
Problem: It is difficult to switch between online help and current work. Solution: Online help information is opened in a separate window when users click on the online help option.	√		
Problem: Some options on the home page are not clearly presented. Solution: Additional brief information is provided to explain each option presented on the home page. However, to avoid annoying users, this interpretation message only appears when users move the mouse to the option.		√	
Problem: The site sometimes does not indicate a task's progress. Solution: Visual cues to indicate a task's progress are provided on the site.		√	
Problem: Links already visited are not clearly marked. Solution: The visited links are marked in italics within the e-government websites.		√	√
Problem: The site allows users to skip over the order of the process. Solution: The mandatory fields are offered in each step for users. Additionally, to address these mandatory fields for users, compulsory information is marked by a red asterisk (*).		√	
Problem: Subject categories are presented without a logical order. Solution: Subject categories are arranged in an alphabetical order on each page of the e-government website.			√
Problem: Users get lost due to being given too many choices during information seeking. Solution: Drop-down menu is designed for the subject category that visually hides its sub options. When users move the mouse to the subject category, a type of stretch sub list is used to present the various sub options associated with this subject category.			√

(√ = problem and solution identified, LA 1 = London Authority 1, LA 2 = London Authority 2, LA 3 = London Authority 3)

Table 6.2 Credibility problems and design solutions within three London Authorities

Credibility problems and design solutions	LA 1	LA 2	LA 3
Problem: Information is presented without consistent colours. Solution: The same colours pattern is applied to present information across the pages of the site.	√		
Problem: Search results are not organised by the level of relevance. Solution: Search results are organised by the level of relevance. Additionally, such relevance levels are highlighted by using visual cues, such as a five-star rating.		√	

<p>Problem: Content is displayed without consistent layout.</p> <p>Solution: The same layout scheme is applied to each subpage of the e-government website.</p>		√	
<p>Problem: There is no clear security message when users access some confidential information.</p> <p>Solution: A security message is provided, indicating that users' personal information will be treated safely and not be shared with any third-party. To inform users, this security message is presented once users access any private services provided on the e-government websites.</p>		√	√
<p>Problem: Detailed contact information has not been organised by different departments of the council.</p> <p>Solution: The contact details are designed into two levels. In the first level, it provides general contact information with associated links to the detailed level of contact information. In the second level, the detailed contact information will be organised by the different departments of the council.</p>			√
<p>Problem: It is not clear to see the site's credentials because the site does not display awards it has earned.</p> <p>Solution: Awards, such as web and Internet standard awards; best council awards; etc., won by the e-government are presented on the web pages.</p>			√
<p>Problem: The site does not provide a shortcut option for access to information about the local council.</p> <p>Solution: A shortcut option is shown on every page within the site, linking the information about the local council. In addition, in order to make such information to be easily found, this shortcut option is consistently located at a fixed place within the site.</p>			√
<p>Problem: It is not clear to indicate how much users have done and how much remains when completing tasks.</p> <p>Solution: Visual cues are provided, which indicate the total steps of the task and highlight the current stage that users are engaged in.</p>			√
<p>Problem: The information about the site update is not clearly presented.</p> <p>Solution: A recently updated date is presented on every page of the e-government website.</p>			√
<p>Problem: It is difficult to see a sign-in option when users access some personal services.</p> <p>Solution: A sign-in/register option is provided within the site. More specifically, when users access some personal services, the site requires users to sign in or register the service in the first place. After logging into the site, it enables users to continue their tasks.</p>			√

(√ = problem and solution identified, LA 1 = London Authority 1, LA 2 = London Authority 2, LA 3 = London Authority 3)

Given the proposed design solutions detailed in this chapter, the issue is to investigate whether or not these proposed design solutions can improve the usability and credibility problems detected in each target London Authority. Therefore, the next chapter presents and discusses the results for experiment 2. Experiment 2 implements these proposed design solutions into the three redesigned e-government websites and invites the participants to assess these usability and credibility design solutions. The

assessment is based on users' perception and their performance. The results obtained from both users' perception and performance are used to compare with the results in experiment 1 in order to indicate the effects of the proposed design solutions on the redesigned e-government websites.

CHAPTER 7

EXPERIMENT 2: IMPROVED USABILITY AND CREDIBILITY ASSESSMENT

7.1 Introduction

Chapter 7 presents and discusses the results for experiment 2. This experiment aims to examine whether the proposed design solutions can improve the usability and credibility problems identified in Chapter 5, using the design solutions presented in Chapter 6. More specifically, this chapter attempts to investigate research questions 3, 4 and 5 (RQ3: What are the effects of the proposed usability design solutions on the usability problems on each target e-government website? RQ4: What are the effects of the proposed credibility design solutions on the credibility problems on each target e-government website? RQ5: What are the effects of the proposed design solutions on users' interaction with each target e-government website?). It assesses the proposed design solutions based on users' perception and their performance when using the three redesigned e-government websites. In detail, users' perception is identified from the results of experiment 2's usability and credibility evaluation questionnaire (showing users' opinions about the proposed design solutions for each redesigned London Authority), while users' performance is measured through observation to indicate the level of users' interaction with the redesigned e-government websites.

Therefore, this chapter starts with the descriptions of the participants and their responses (section 7.2). This is followed by presenting the results in terms of users' perception (section 7.3) and users' performance (section 7.4). Finally, a discussion and conclusion about the improved usability and credibility of the redesigned e-government websites is provided at the end of the chapter (section 7.5).

7.2 Description of the participants and their responses

This section describes the participants' demographic information and their responses in experiment 2. The demographic information is based on the participants' characteristics in terms of gender, age and Internet use to show the distribution of the participants across the three redesigned e-government websites. In addition, the participants' responses are used to show the distribution of the sets of data obtained from users' perception and performance in each redesigned e-government website. The detailed descriptions are presented in the following sub-sections.

7.2.1 Description of the participants

The purpose of a description of the participants' demographic information is to show that the distribution of the participants across the three redesigned e-government websites in experiment 2 is unbiased. As indicated previously (see section 6.5), experiment 2 aims to assess the effects of the proposed design solutions on the identified usability and credibility problems based on the comparative measurement in terms of the participants' perception and their task performance. In order to support the comparative analysis before and after the proposed design solutions have been implemented in experiment 1 and experiment 2 respectively, and identify the participants' perception and performance changes, the same number of the participants in experiment 1 is allocated for each redesigned e-government website in experiment 2 (N=12). In addition, they are the same participants who have taken part in experiment 1. Therefore, as it is shown by the analysis of the participants' demographic information in terms of gender, age and Internet use in experiment 1 (see Chapter 5.2.1), it indicates that the participants are equally allocated across the three target London Authorities. Accordingly, it suggests that the distribution of the participants in the three redesigned e-government websites is by and large unbiased.

7.2.2 Description of the participants' responses

Having indicated the participants' distribution in experiment 2, to conduct data analysis techniques for experiment 2, such as a Paired-Samples T-test, the normality of data sets is prerequisite (Foster, 2001). In other words, the parametric statistics used for experiment 2 is only meaningful for the sets of data that follows a normal distribution. Therefore, there is a need to analyse the distribution of the data sets used in experiment 2. This part describes the distribution of data obtained from both users' perception and performance. To examine data distribution normality, the one sample Kolmogorov-Smirnov test (K-S test) is selected since it is commonly used to analyse distribution normality (Foster, 2001), and its validity has been proven by a large number of studies (e.g. Hinton et al., 2004; Kinnear, 2008; Pallant, 2001). Thus, a one sample K-S test is used to determine whether the participants' responses to the specific usability and credibility questions regarding each redesigned e-government website follow a normal distribution. Similarly, a one sample K-S test is also employed to indicate whether the sets of data from the participants' performance with each redesigned e-government website is a normal distribution. Within the one sample K-S test results, a significant P-value indicates a probability that the sample distribution is different from an expected probability distribution (e.g. a normal distribution). If the significant value (P-value) is greater than 0.05, it indicates that the data set follows a normal distribution. On the contrary, the results suggest the distribution is not a normal distribution when the significant value (P-value) is less than 0.05.

Table 7.1 presents the results of the K-S test with respect to participants' responses regarding the specific usability and credibility questions in London Authority 1 and the redesigned London Authority 1 respectively. As shown in Table 7.1, the significant value in each specific question is greater than $P=0.05$. Therefore, it implies that the distribution of the participants' responses to the specific usability and credibility questions regarding London Authority 1 and the redesigned London Authority 1 follows a normal distribution (see Appendix 13b for the detailed K-S test results).

Table 7.1 Specific usability and credibility questions responses distribution in London Authority 1 and the redesigned London Authority 1

	Usability question 40	Usability question 33	Usability question 41	Credibility question 2
Experiment 1 - London Authority 1				
Significance	0.732	0.181	0.303	0.465
Experiment 2 - Redesignated London Authority 1				
Significance	0.145	0.170	0.145	0.505

Table 7.2 shows the results of the K-S test regarding participants' responses to the specific usability and credibility questions in London Authority 2 and the redesigned London Authority 2 respectively. As shown in Table 7.2, the significant value of each specific question responses in London Authority 2 and the redesigned London Authority 2 is also more than $P=0.05$. This suggests that the distribution of participants' responses regarding the specific usability and credibility questions in London Authority 2 and the redesigned London Authority 2 follows a normal distribution (see Appendix 13b for the detailed K-S test results).

Table 7.2 Specific usability and credibility questions responses distribution in London Authority 2 and the redesigned London Authority 2

	Usability question 33	Usability question 24	Usability question 6	Usability question 32
Experiment 1 - London Authority 2				
Significance	0.303	0.450	0.551	0.164
Experiment 2 - Redesignated London Authority 2				
Significance	0.139	0.668	0.310	0.068
	Usability question 19	Credibility question 2	Credibility question 24	Credibility question 39
Experiment 1 - London Authority 2				
Significance	0.217	0.287	0.509	0.455
Experiment 2 - Redesignated London Authority 2				
Significance	0.164	0.329	0.070	0.145

Table 7.3 presents the results of the K-S test regarding the participants' responses to the specific usability and credibility questions in London Authority 3 and the redesigned London Authority 3. As shown in Table 7.3, the significant value of each specific question responses in London Authority 3 and the redesigned London Authority 3 is greater than $P=0.05$. As such, this suggests that the distribution of the participants' responses of each specific usability and credibility questions regarding London Authority 3 and the redesigned London Authority 3 follows a normal distribution (see Appendix 13b for the detailed K-S test results).

Table 7.3 Specific usability and credibility questions responses distribution in London Authority 3 and the redesigned London Authority 3

	Usability question 33	Usability question 32	Usability question 9	Usability question 16
Experiment 1 - London Authority 3				
Significance	0.203	0.222	0.262	0.262
Experiment 2 - Redesign London Authority 3				
Significance	0.310	0.210	0.370	0.084
	Usability question 13	Credibility question 39	Credibility question 20	Credibility question 16
Experiment 1 - London Authority 3				
Significance	0.139	0.450	0.209	0.407
Experiment 2 - Redesign London Authority 3				
Significance	0.451	0.070	0.092	0.130
	Credibility question 15	Credibility question 23	Credibility question 25	Credibility question 38
Experiment 1 - London Authority 3				
Significance	0.079	0.509	0.187	0.509
Experiment 2 - Redesign London Authority 3				
Significance	0.145	0.139	0.145	0.130

Furthermore, Tables 7.4, 7.5 and 7.6 present the distribution of the participants' performance with the target London Authorities in experiments 1 and 2 respectively. As shown in Table 7.4, the results of the K-S test indicate that the significant value of the participants' performance with London Authority 1, in terms of time spent completing tasks; number of steps to accomplish tasks; online help required and number of successful tasks completion, is greater than P-value 0.05, which suggest that the distribution of the participants' performance with London Authority 1 follows a normal distribution. Moreover, the significant value of the participants' performance with the redesigned London Authority 1, in terms of total time spent completing tasks and number of steps to finish tasks is greater than $P=0.05$. Thus, the findings suggest that the participants' performance in terms of total time spent for task completion and number of steps to finish all tasks with the redesigned London Authority 1 follows a normal distribution. However, there is no online help required for tasks completion and all tasks are completed successfully in the redesigned London Authority 1. Thus the significant value in terms of amount of online help required and number of successful tasks completion is not available (see Appendix 13b for the detailed K-S test results).

Table 7.4 Performance distribution in London Authority 1 and the redesigned London Authority 1

	Total time for all tasks completion	Number of steps to complete tasks	Helps required for tasks completion	Number of successful tasks completion
Experiment 1 - London Authority 1				
Significance	0.841	0.968	0.130	0.390
Experiment 2 - Redesigned London Authority 1				
Significance	0.980	0.819	N/A	N/A

As shown in Table 7.5, the results of the K-S test indicate that the significant value of the participants' performance, in terms of time spent completing tasks; number of steps to accomplish tasks; online help required and number of successful tasks completion, in experiment 1 is greater than P-value 0.05. Such findings suggest that the distribution of the participants' performance with London Authority 2 follows a normal distribution. Regarding experiment 2, the significant value of the participants' performance in terms of total time spent completing tasks and number of steps to finish tasks, is greater than P=0.05. As such, the findings suggest that the participants' performance, in terms of total time spent completing the tasks and number of steps to finish the tasks with the redesigned London Authority 2 follows a normal distribution. However, there is no help required for tasks completion and all tasks are completed successfully in the redesigned London Authority 2. Thus, the significance of the participants' performance in terms of amount of online help required and number of successful tasks completion is not available (see Appendix 13b for the detailed K-S test results).

Table 7.5 Performance distribution in London Authority 2 and the redesigned London Authority 2

	Total time for all tasks completion	Number of steps to complete tasks	Helps required for tasks completion	Number of successful tasks completion
Experiment 1 - London Authority 2				
Significance	0.371	0.818	0.203	0.141
Experiment 2 - Redesigned London Authority 2				
Significance	0.386	0.996	N/A	N/A

Table 7.6 shows the distribution of the participants' performance with London Authority 3 and the redesigned London Authority 3. As indicated in Table 7.6, the results of the K-S test show that the significant value of the participants' performance, in terms of time spent completing tasks; number of steps to accomplish tasks and number of successful tasks completion, with London Authority 3 is greater than P=0.05. It implies that the distribution of the participants' performance in terms of

time spent completing tasks; number of steps to accomplish tasks and number of successful tasks completion with London Authority 3 follows a normal distribution. However, there is no help required for tasks completion. The significance of the participants' performance in terms of amount of online help required is not available. Regarding the participants' performance with the redesigned London Authority 3, the significant value of the participants' performance, in terms of total time spent completing tasks and number of steps to finish tasks, is greater than P-value 0.05. Therefore, it suggests that the participants' performance in terms of total time for tasks completion and number of steps completing the tasks with the redesigned London Authority 3 follows a normal distribution. However, there is no help requirement for tasks completion and all tasks are completed successfully in the redesigned London Authority 3. Thus, the significance of the participants' performance in terms of amount of online help required and number of successful tasks completion is not available (see Appendix 13b for the detailed K-S test results).

Table 7.6 Performance distribution in London Authority 3 and the redesigned London Authority 3

	Total time for all tasks completion	Number of steps to complete tasks	Helps required for tasks completion	Number of successful tasks completion
Experiment 1 - London Authority 3				
Significance	0.949	0.750	N/A	0.102
Experiment 2 - Redesigned London Authority 3				
Significance	0.983	0.645	N/A	N/A

7.3 Users' perception

Users' perception is reflected in the participants' judgments and resulting choices from a range of options expressed throughout the questionnaire. It aims to assess whether the proposed design solutions can solve the usability and credibility problems found in experiment 1. To have a better understanding of the participants' perception, both quantitative and qualitative data are collected. More specifically, quantitative data uses the results from the closed questions in the questionnaire to reveal the participants' assessments of the proposed design solutions. Qualitative data presents the participants' further thoughts about the proposed design solutions for the redesigned e-government websites from the open-ended questions in the questionnaire.

7.3.1 Users' perception: quantitative data

This section describes the participants' assessment of the proposed design solutions for the three redesigned e-government websites from the perspective of the quantitative data. To examine whether or not the proposed design solutions have improved the identified usability and credibility problems, a Paired-Samples T-test is used in this study. More specifically, a Paired-Samples T-test is applied to indicate whether there is a difference in the participants' assessments of the specific usability features between experiment 1 and experiment 2. Similarly, a Paired-Samples T-test is employed to determine whether or not the participants' assessments of the specific credibility features in experiment 2 differ from experiment 1. In this way, it can statistically show the participants' assessments of the specific usability and credibility features before and after the proposed design solutions have been implemented in experiments 1 and 2 respectively. The following sub-sections detail the results for each redesigned London Authority.

The redesigned London Authority 1

Table 7.7 presents all proposed design solutions in relation to the identified usability and credibility problems in London Authority 1. These proposed solutions are designed into the target London Authority 1. The effects of the proposed design solutions on each identified usability and credibility problem are presented in the following sections.

Table 7.7 Design solutions regarding the identified usability and credibility problems for the redesigned London Authority 1

London Authority 1	Proposed design solutions
Usability problem 1	Link colours used in London Authority 1 are reduced and changed to purple, especially in the quick online service, since purple is commonly regarded as the most frequently used link colour within the site. In addition, in order to keep this link colour scheme, such a change is consistently implemented throughout London Authority 1.
Usability problem 2	An online help option is provided on every page of London Authority 1 linking user support information and placed in a fixed location of each page.
Usability problem 3	Online help information is opened in a separate window when users click on the online help option.
Credibility problem 1	The same colours pattern is applied to present information across the pages of the site.

Regarding the usability problem that users are confused by links that have many different colours, the results of the Paired-Samples T-test show a significant

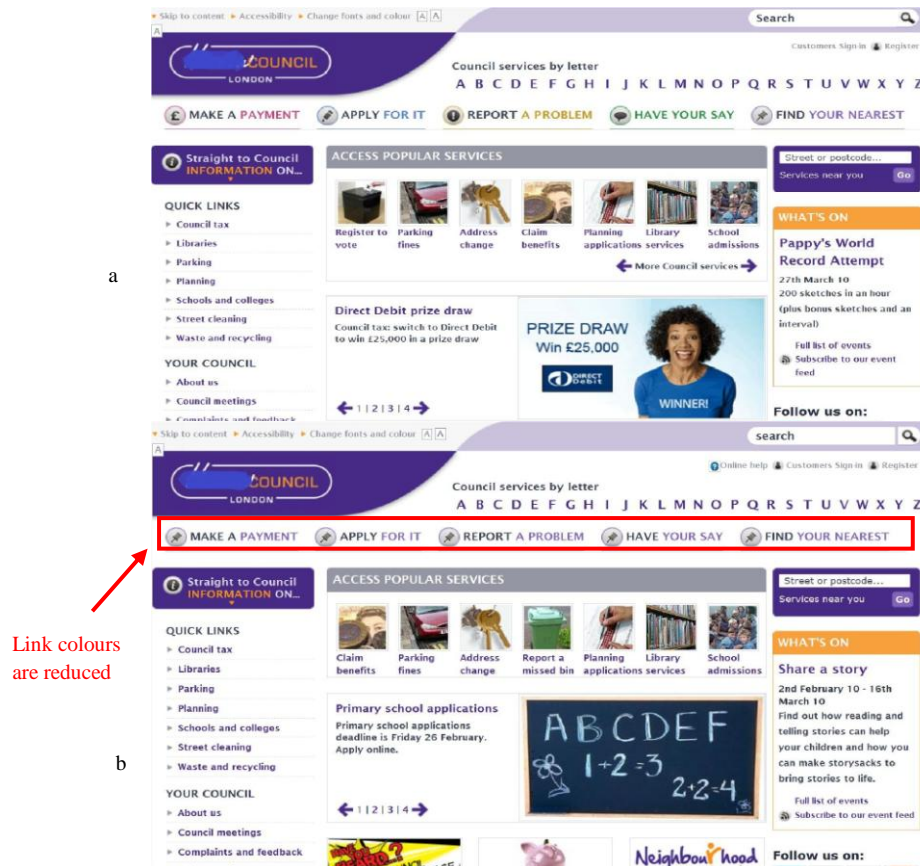
difference in the participants' perception between experiments 1 and 2. Table 7.8 presents the view of the participants about link colours in experiments 1 and 2. As shown in Table 7.8, over half of the participants (66.7%) in experiment 1 indicated their confusion about links with many different colours. In contrast, a majority of the participants (91.7%) have a negative opinion about confusion with links that have many different colours in experiment 2 (see Appendix 10a for the detailed Paired-Samples T-test results).

Table 7.8 Users' perception of links colours in experiment 1 and experiment 2

I am confused with links that have many different colours.				
	Experiment 1 (N=12)		Experiment 2 (N=12)	
	N	%	N	%
Strongly disagree	0	0%	9	75%
Disagree	3	25%	2	16.7%
Neutral	1	8.3%	1	8.3%
Agree	6	50%	0	0%
Strongly agree	2	16.7%	0	0%
Significance				T=-7.386, P=0.000

As suggested (see section 6.2), to decrease link colours distraction when users interact with the site, the proposed design solution that reduces link colours has been applied to the redesigned London Authority 1 in experiment 2. As shown in Figure 7.1a, initially, there are many different link colours that have been used in London Authority 1. However, as shown in Figure 7.1b, link colours used in London Authority 1 are reduced, especially, in the quick online service links. The results of experiment 2 reveal that the participants' confusion resulting from links with many different colours is significantly reduced in the redesigned London Authority 1. In other words, the usability problem of links with many different colours has been significantly improved by the proposed design solution.

Figure 7.1 Usability problem 1 in London Authority 1 and the design solution in the redesigned London Authority 1



With respect to the next usability problem of the online help function not being clearly presented on the site, the results of the Paired-Samples T-test show that there is a significant difference in the participants' assessments between experiments 1 and 2. Table 7.9 shows the view of the participants on the online help function presentation in experiments 1 and 2. As revealed in Table 7.9, more than half of the participants (58.3%) in experiment 1 think that it is difficult to find the online help function on the site. On the contrary, all participants (100%) in experiment 2 assess it differently, which the online help function can be easily found in the redesigned London Authority 1.

Table 7.9 Users' perception of online help functions in experiment 1 and experiment 2

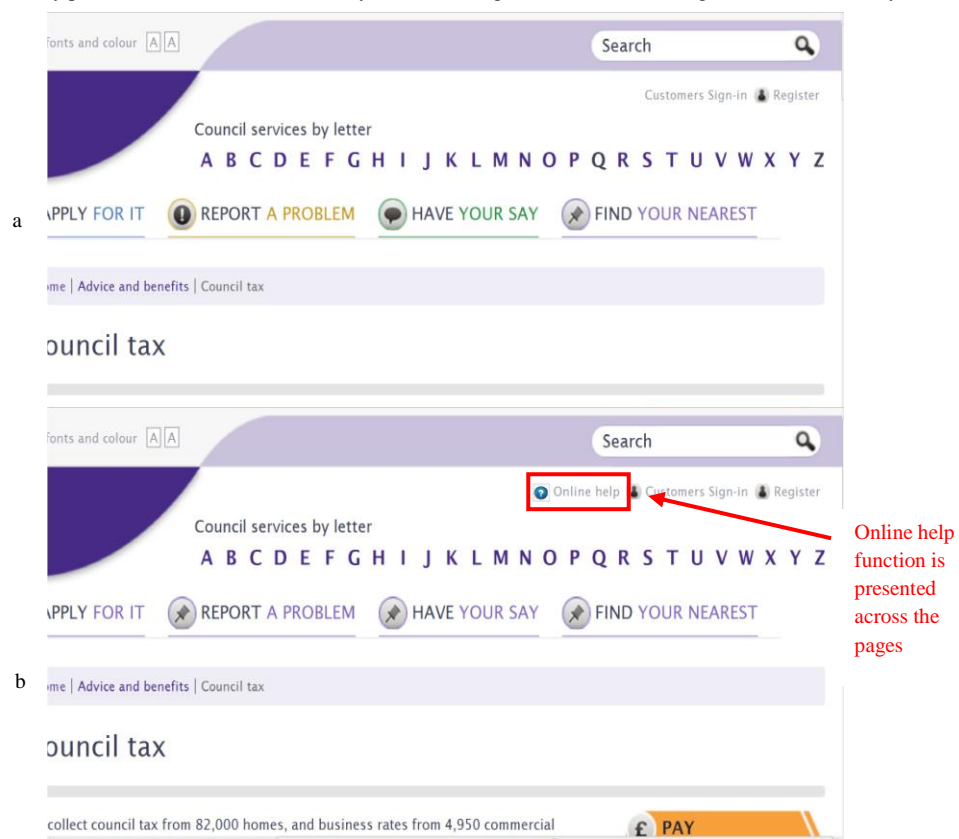
It is easy to find help functions in the system.				
	Experiment 1 (N=12)		Experiment 2 (N=12)	
	N	%	N	%
Strongly disagree	3	25%	0	0%
Disagree	4	33.3%	0	0%
Neutral	4	33.3%	0	0%
Agree	0	0%	6	50%
Strongly agree	1	8.3%	6	50%

Significance

T=-5.922, P=0.000

As suggested, in order to increase the online help function identification, the proposed design solution provides a shortcut option linking user support information and places this option in a fixed position throughout the site. Figure 7.2a presents an example of the website before the proposed design solution has been applied to London Authority 1. Figure 7.2b shows how an online help option is positioned on the top right of the page throughout London Authority 1. In this way, the online help function can be easily detected and accessed by users at any time. The results of experiment 2 show that the participants' perception of the online help function indication has improved in the redesigned London Authority 1. Therefore, the usability problem of the online help function not being clearly indicated on the site may be solved by the proposed design solution.

Figure 7.2 Usability problem 2 in the London Authority 1 and the design solution in the redesigned London Authority 1



With regards to the usability problem of the difficult switch between online help and current work, the results of the Paired-Samples T-test show that there is a significant

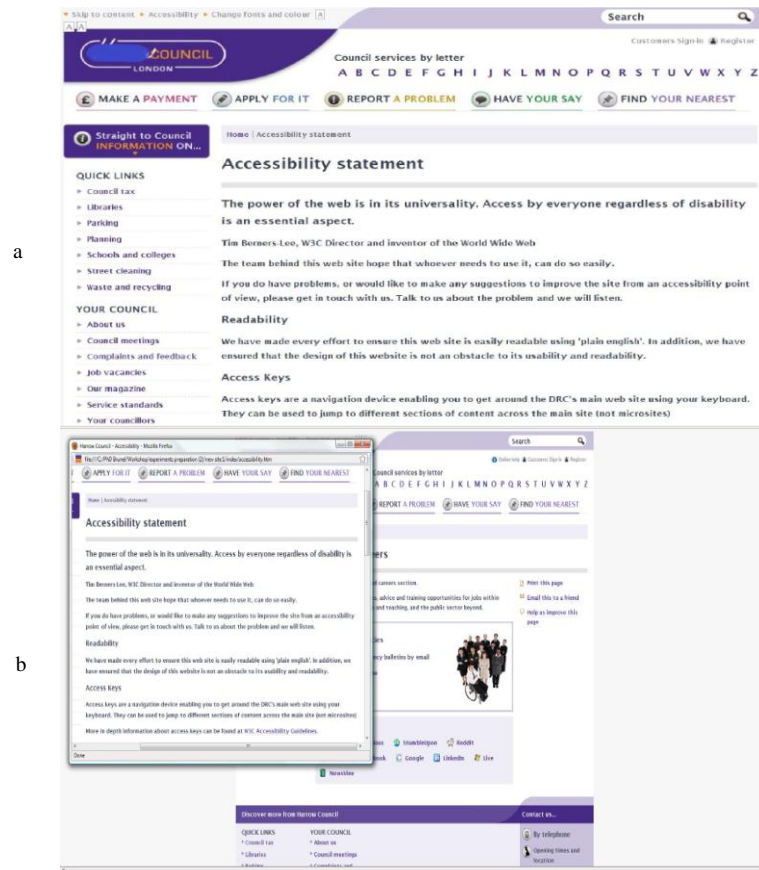
difference in the participants' assessments between experiment 1 and experiment 2. Table 7.10 presents the view of the participants on the difficulty of switching between online help and current work in experiments 1 and 2. As shown in Table 7.10, very few participants (16.7%) in experiment 1 think there is an ease of switching between online help and their current work. However, the participants perceive it to be the opposite case in experiment 2, where all participants (100%) find the switch between online help and their current work easy to make on the redesigned London Authority 1 website.

Table 7.10 Users' perception of the switch between online help and their current work in experiment 1 and experiment 2

It is easy to switch between online-help and my current work.				
	Experiment 1 (N=12)		Experiment 2 (N=12)	
	N	%	N	%
Strongly disagree	1	8.3%	0	0%
Disagree	3	25%	0	0%
Neutral	6	50%	0	0%
Agree	2	16.7%	6	50%
Strongly agree	0	0%	6	50%
Significance	T=-5.745, P=0.000			

The results show that the difficulty of switching between online help and current work is improved in experiment 2. As proposed, once users click on the online help option, online help information is opened in a separate window on the redesigned London Authority 1. Figure 7.3a shows that when users select the online help link, the current work content is replaced by online help information. However, in Figure 7.3b, online help information and users' current work are presented in the separate windows when users choose the online help option, so that users can easily switch between them. In this way, it can reduce users' memory load problems and support users' current work page retrieval. According to the results, this implies that the usability problem of the difficult switch between online help and current work has been improved by the proposed design solution.

Figure 7.3 Usability problem 3 in London Authority 1 and the design solution in the redesigned London Authority 1



Regarding the credibility problem that information is presented without consistent colours, the results of the Paired-Sample T-test show that the participants' assessments of this in experiment 2 have a significant difference from their assessments in experiment 1. Table 7.11 shows the view of the participants on colours consistency in experiments 1 and 2. As shown in Table 7.11, very few participants (16.7%) think that information is presented with consistent colours in experiment 1, whereas over half of the participants (66.7%) in experiment 2 think information presentation with consistent colours on the redesigned London Authority 1 website (see Appendix 10a for the detailed Paired-Samples T-test results).

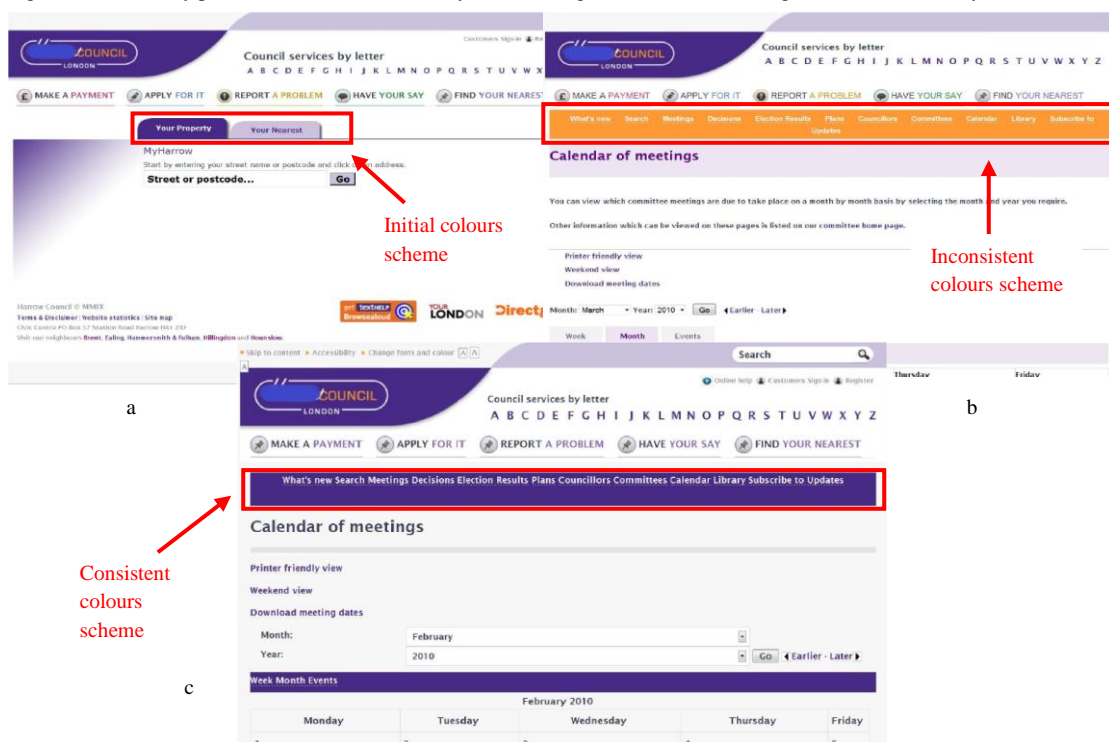
Table 7.11 Users' perception of colour consistency in experiment 1 and experiment 2

	Experiment 1 (N=12)		Experiment 2 (N=12)	
	N	%	N	%
Strongly disagree	2	16.7%	0	0%
Disagree	3	25%	3	25%
Neutral	5	41.6%	1	8.3%
Agree	2	16.7%	3	25%

Strongly agree	0	0%	5	41.7%
Significance				T=-2.611, P=0.024

The results show that information presentation with colours consistency is improved in experiment 2. As proposed, the design solution is to keep the consistent colour scheme throughout the redesigned London Authority 1. As shown in Figure 7.4a, generally, the options on the menu bar are presented in a white font with blue background on the subpages of London Authority 1. However, on the subpage of the council meeting, options, the menu bar are presented differently, with a white font and yellow background (see Figure 7.4b). Figure 7.4c indicates the consistent colours scheme that is used to present information on this subpage. According to the results, it suggests that the credibility problem of information presentation without consistent colours has been improved by the proposed design solution.

Figure 7.4 Credibility problem 1 in London Authority and the design solution in the redesigned London Authority 1



The redesigned London Authority 2

Table 7.12 presents all the proposed design solutions regarding the identified usability and credibility problems for the redesigned London Authority 2. The following

paragraphs detail the assessment of the proposed design solutions for each usability and credibility problem.

Table 7.12 Design solutions regarding the identified usability and credibility problems for the redesigned London Authority 2

London Authority 2	Proposed design solutions
Usability problem 1	Additional brief information is provided to explain each option presented on the home page. However, to avoid annoying users, this interpretation message only appears when users move the mouse to the option.
Usability problem 2	Link colours used within London Authority 2 are reduced.
Usability problem 3	Visual cues to indicate a task's progress are provided on the site.
Usability problem 4	The visited links are marked in italics within London Authority 2.
Usability problem 5	The mandatory fields are offered in each step for users. Additionally, to address these mandatory fields for users, compulsory information is marked by a red asterisk (*).
Credibility problem 1	Search results are organised by level of relevance. Additionally, such a relevance level is highlighted by using visual cues, such as a five-star rating.
Credibility problem 2	The same layout scheme is applied to each subpage of London Authority 2.
Credibility problem 3	A security message is provided, indicating that users' personal information will be treated safely and not be shared with any third-party. To inform users, this security message is presented once users access any private services provided on the e-government website.

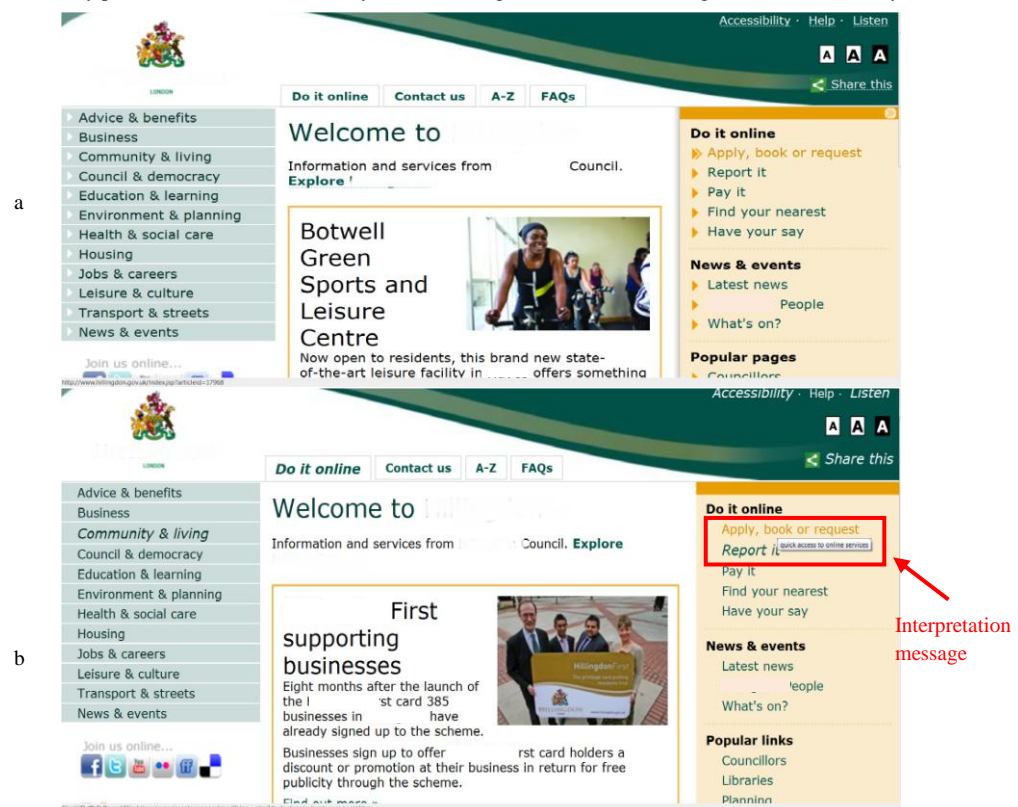
With regard to usability problem 1 that some options on the home page are not clearly presented, the results of the Paired-Samples T-test show that there is a significant difference in the participants' assessments between experiment 1 and experiment 2. Table 7.13 presents the assessments of the participants about the home page options in experiments 1 and 2. As shown in Table 7.13, a large number of the participants (83.4%) in experiment 1 indicated their confusion with the options presented on the home page, whereas over half of the participants (66.7%) in experiment 2 assess that it is not confused with the options presented on the home page on the redesigned London Authority 2 website (see Appendix 10b for the detailed Paired-Samples T-test results).

Table 7.13 Users' perception of home page options presentation in experiment 1 and experiment 2

It is confused at the home page because some options are not clearly presented.				
	Experiment 1 (N=12)		Experiment 2 (N=12)	
	N	%	N	%
Strongly disagree	1	8.3%	3	25%
Disagree	0	0%	5	41.7%
Neutral	1	8.3%	4	33.3%
Agree	8	66.7%	0	0%
Strongly agree	2	16.7%	0	0%
Significance				T= -4.468, P=0.001

The design solution that provides additional information to explain each option presented on the home page has been implemented on the redesigned London Authority 2. Figure 7.5a shows an example of some options that are not clearly presented on the home page. However, Figure 7.5b presents an interpretation message that is displayed to improve recognition when the mouse is moved to an option. It gives the participants further information to increase their understanding of the option. The results of experiment 2 indicate that confusion of options presentation is reduced in the redesigned London Authority 2. Therefore, it appears that the proposed design solution has improved the usability problem that some options are not clearly presented on the home page.

Figure 7.5 Usability problem 1 in London Authority 2 and the design solution in the redesigned London Authority 2



Regarding the usability problem of confusion from links that have many different colours, the results of the Paired-Samples T-test find that there is a significant difference in the participants' assessments between experiment 1 and experiment 2. Table 7.14 shows the view of the participants on link colours in experiments 1 and 2. As shown in Table 7.14, over half of the participants (66.7%) find it confusing that

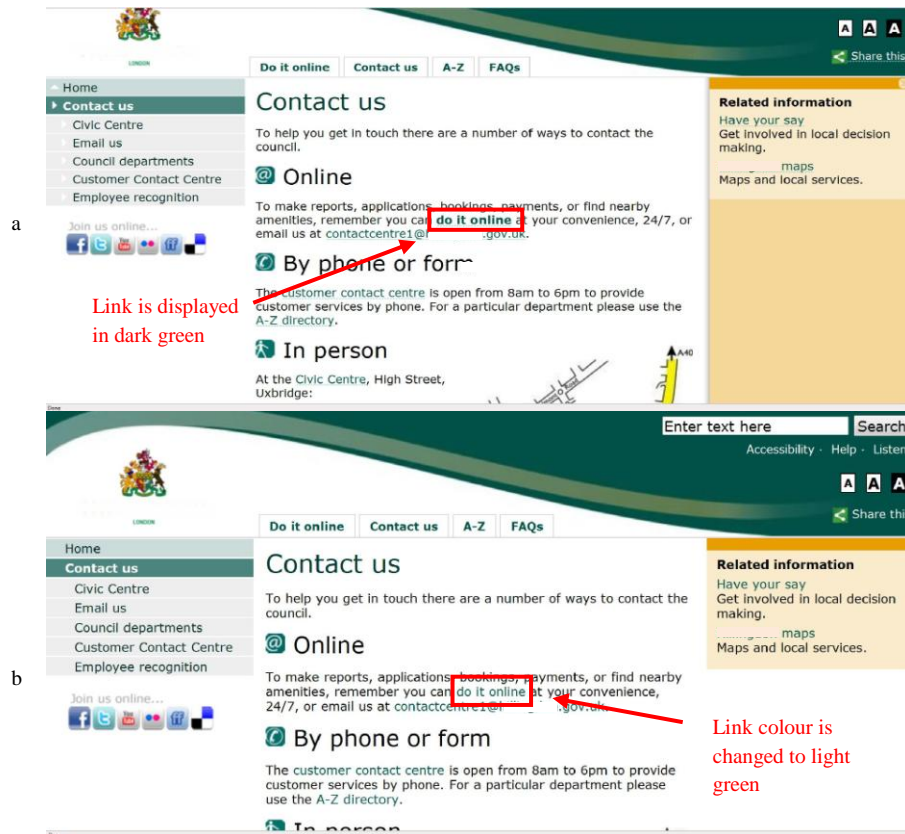
links have many different colours in experiment 1, whereas the majority of participants (83.4%) in experiment 2 find that they are not confused with link colours on the redesigned London Authority 2 website.

Table 7.14 Users' perception of link colours in experiment 1 and experiment 2

I am confused with links that have many different colours.				
	Experiment 1 (N=12)		Experiment 2 (N=12)	
	N	%	N	%
Strongly disagree	0	0%	3	25%
Disagree	1	8.3%	7	58.4%
Neutral	3	25%	1	8.3%
Agree	6	50%	1	8.3%
Strongly agree	2	16.7%	0	0%
Significance	T= -4.706, P=0.001			

The results show that the participants' assessments of link colours are significantly changed in experiment 2. The design solution of reducing link colours has been applied to the redesigned London Authority 2. As shown in Figure 7.6a, originally, some links on London Authority 2 are presented in light green, and some links are displayed in dark green. However, as indicated in Figure 7.6b, the links displayed in dark green have been changed to light green. This can reduce link colours distraction when users search for information throughout the site. Based on the results in experiment 2, this implies that the proposed design solution has improved the usability problem of confusion with links having many different colours.

Figure 7.6 Usability problem 2 in London Authority 2 and the design solution in the redesigned London Authority 2



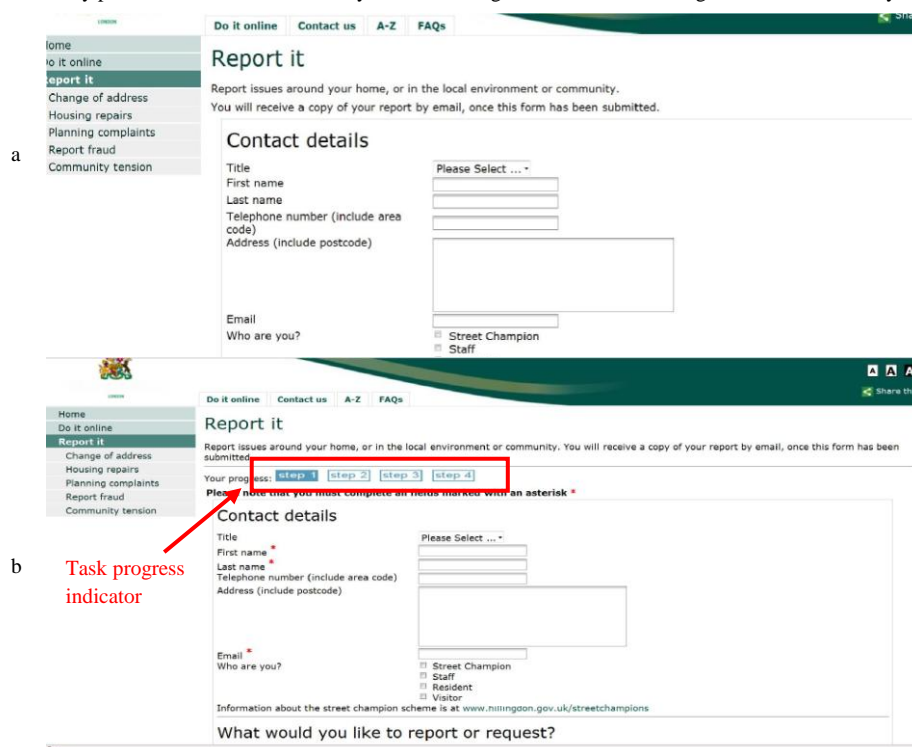
In terms of the usability problem that the site sometimes does not indicate a task's progress, the results of the Paired-Sample T-test show that the participants' assessments in experiment 2 have a significant difference compared to their assessments in experiment 1. Table 7.15 presents the participants' perception about task progress indication in experiments 1 and 2. As shown in Table 7.15, more than half of the participants (58.4%) find a difficulty in seeing their task progress in experiment 1. However, all participants (100%) in experiment 2 can clearly identify task progress on the redesigned London Authority 2.

Table 7.15 Users' perception of task progress in experiment 1 and experiment 2

	Experiment 1 (N=12)		Experiment 2 (N=12)	
	N	%	N	%
Strongly disagree	2	16.7%	0	0%
Disagree	5	41.7%	0	0%
Neutral	4	33.3%	0	0%
Agree	1	8.3%	8	66.7%
Strongly agree	0	0%	4	33.3%
Significance	T= -8.124, P=0.000			

The results indicate that the participants' perception of the absence of task progress indication is significantly improved in experiment 2. The design solution of providing a task status bar has been implemented on the redesigned London Authority 2. This can visually help the participants measure their task progress (Figure 7.7a presents an example of the online service without the task progress indication. Figure 7.7b shows task progress within the online service, as visually presented on the site). The findings indicate that this proposed design solution is useful for solving the usability problem of task progress not being indicated on the site.

Figure 7.7 Usability problem 3 in London Authority 2 and the design solution in the redesigned London Authority 2



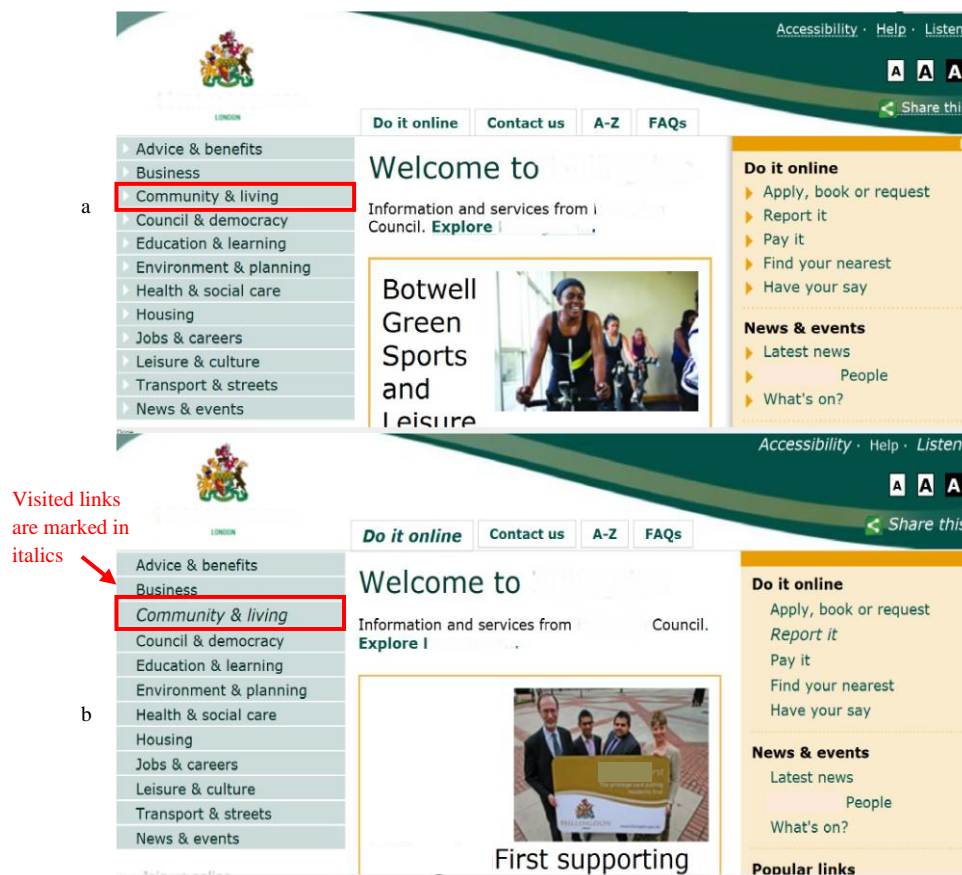
In the usability problem of visited links not being clearly marked, the results of the Paired-Samples T-test indicate that there is a significant difference in the participants' assessments between experiment 1 and experiment 2. Table 7.16 presents the view of the participants on visited links recognition in experiments 1 and 2. As shown in Table 7.16, only a small number of the participants (25%) can distinguish used and unused links in experiment 1, whereas in experiment 2, about 83.4% of the participants can recognise visited links on the redesigned London Authority 2 website.

Table 7.16 Users' perception of visited links recognition in experiment 1 and experiment 2

It clearly indicates which choices/links are already used because visited links have been marked.				
	Experiment 1 (N=12)		Experiment 2 (N=12)	
	N	%	N	%
Strongly disagree	2	16.7%	0	0%
Disagree	6	50%	1	8.3%
Neutral	1	8.3%	1	8.3%
Agree	2	16.7%	8	66.7%
Strongly agree	1	8.3%	2	16.7%
Significance	T= -6.189, P=0.000			

In experiment 2, the proposed design solution of marking all visited links in italics has been applied to the redesigned London Authority 2 website (Figure 7.8a shows that the links already visited in London Authority 2 have not been clearly marked; Figure 7.8b indicates that the visited links on the site are clearly marked in italics). Such a solution can increase visited links recognition. The results show that the participants' recognition of visited links is significantly improved in the redesigned London Authority 2 website. Accordingly, it suggests that the proposed design solution has improved the usability problem of visited links not being clearly marked on the site.

Figure 7.8 Usability problem 4 in London Authority 2 and the design solution in the redesigned London Authority 2



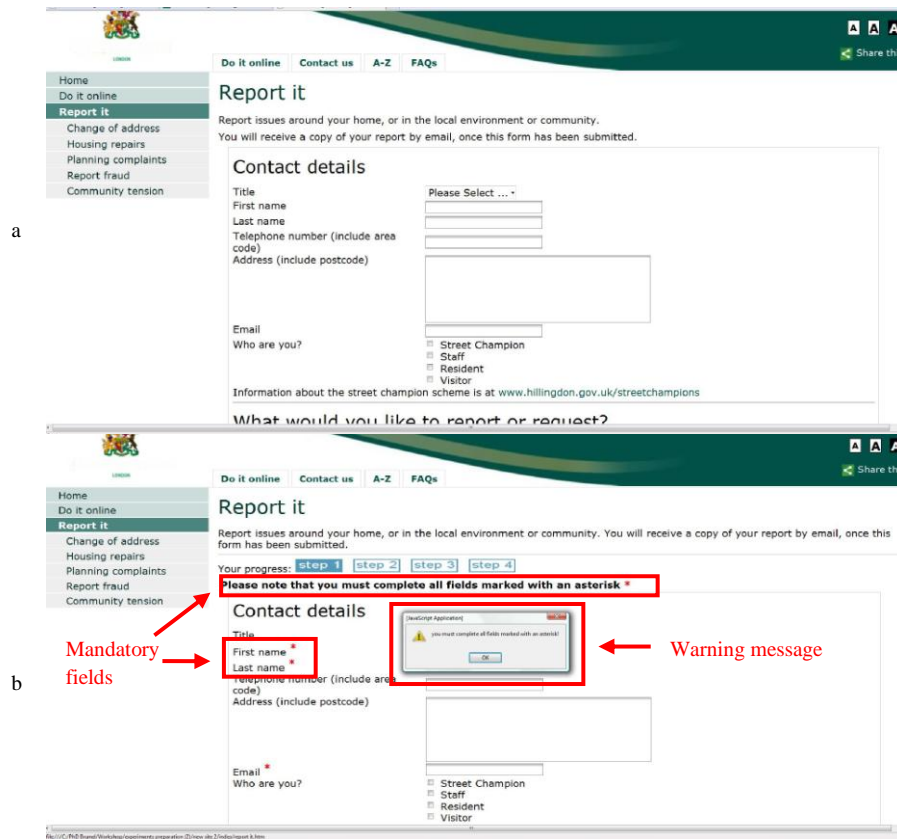
With respect to the usability problem that the site allows users to skip over the order of the process, the results of the Paired-Samples T-test show that there is a significant difference in the participants' assessments between experiment 1 and experiment 2. Table 7.17 shows the view of the participants on jumping stages in the process in experiments 1 and 2. As presented in Table 7.17, most participants (91.7%) in experiment 2 think that it is not easy to skip over the order of the process, which is much higher than the participants' assessment in experiment 1 (50%).

Table 7.17 Users' perception of jumping stages in the process in experiment 1 and experiment 2

It is easy to make errors in an action because the system allows me to skip over the order of the process.				
	Experiment 1 (N=12)		Experiment 2 (N=12)	
	N	%	N	%
Strongly disagree	0	0%	4	33.4%
Disagree	6	50%	7	58.3%
Neutral	4	33.3%	1	8.3%
Agree	2	16.7%	0	0%
Strongly agree	0	0%	0	0%
Significance	T= 3.527, P=0.005			

Such results indicate that the participants' assessments of skipping stages in the process have been significantly changed in the redesigned London Authority 2. The design solution is to design the mandatory fields in each step of a service process on the redesigned London Authority 2 website, which forces users to follow the order of the process (Figure 7.9a shows an example of London Authority 2 in which users can skip over the order of the process. However, as indicated in Figure 7.9b, the mandatory fields are clearly marked by red asterisks (*) and a warning message is presented to remind users to complete necessary information in the mandatory fields). Based on the results, it implies that the proposed design solution has improved the usability problem of the site allowing users to skip over the order of the process.

Figure 7.9 Usability problem 5 in London Authority 2 and the design solution in the redesigned London Authority 2



In terms of the credibility problem of search results not being organized by level of relevance, the results of the Paired-Samples T-test show that there is a significant difference in the participants' assessments between experiments 1 and 2. Table 7.18 presents the view of the participants on search results arrangement in experiments 1 and 2. As revealed in Table 7.18, the major participants (66.7%) in experiment 1 indicate that the search results are not organized by level of relevance, whereas all participants (100%) in experiment 2 find that the search results are arranged by level of relevance in the redesigned London Authority 2 (see Appendix 10b for the detailed Paired-Samples T-test results).

Table 7.18 Users' perception of level of relevance arrangement of search results in experiment 1 and experiment 2

	Experiment 1 (N=12)		Experiment 2 (N=12)	
	N	%	N	%
Strongly disagree	1	8.3%	0	0%
Disagree	3	25%	0	0%
Neutral	5	41.7%	0	0%
Agree	3	25%	5	41.7%
Strongly agree	0	0%	7	58.3%

Significance

T= -5.326, P= 0.000

Figure 7.10a shows an example of search results in London Authority 2 that are not organised by the level of relevance. However, as presented in Figure 7.10b, search results are arranged by level of relevance and visually indicated for users. This can support the participants understanding of the overall arrangement of the search results and so quickly identify target objects. The findings show that the participants' assessments of search results arrangement is enhanced in experiment 2. Thus, the proposed design solution has improved the credibility problem of search results not being organised by level of relevance.

Figure 7.10 Credibility problem 1 in London Authority 2 and the design solution in the redesigned London Authority 2

Figure 7.10 consists of two screenshots, (a) and (b), comparing search results in London Authority 2. Both screenshots show a search bar with the keyword 'personal tax' and a 'Search' button. Below the search bar, the results are displayed as a list of links with brief descriptions.

Screenshot (a) shows the original interface. The search results are not sorted by relevance. The results are: 'Working parents', 'What is a payment card?', 'Reporting fraud and corruption', 'What information is on the card?', and 'Basic rules of the scheme'. A red arrow points to the search results, with the text 'Search results are arranged by level of relevance'.

Screenshot (b) shows the redesigned interface. The search results are sorted by relevance. The results are: '1. More assistance with council tax', '2. I live alone do I get any reduction in the council tax I pay?', '3. Student discount', '4. Basic rules of the scheme', and '5. What is a payment card?'. A red box highlights the top results, and a red arrow points to the sorting options 'Sort by date / Sort by relevance'.

For the credibility problem of information presentation without a consistent layout, the results of the Paired-Samples T-test reveal that there is a significant difference in the participants' assessments between experiments 1 and 2. Table 7.19 presents the

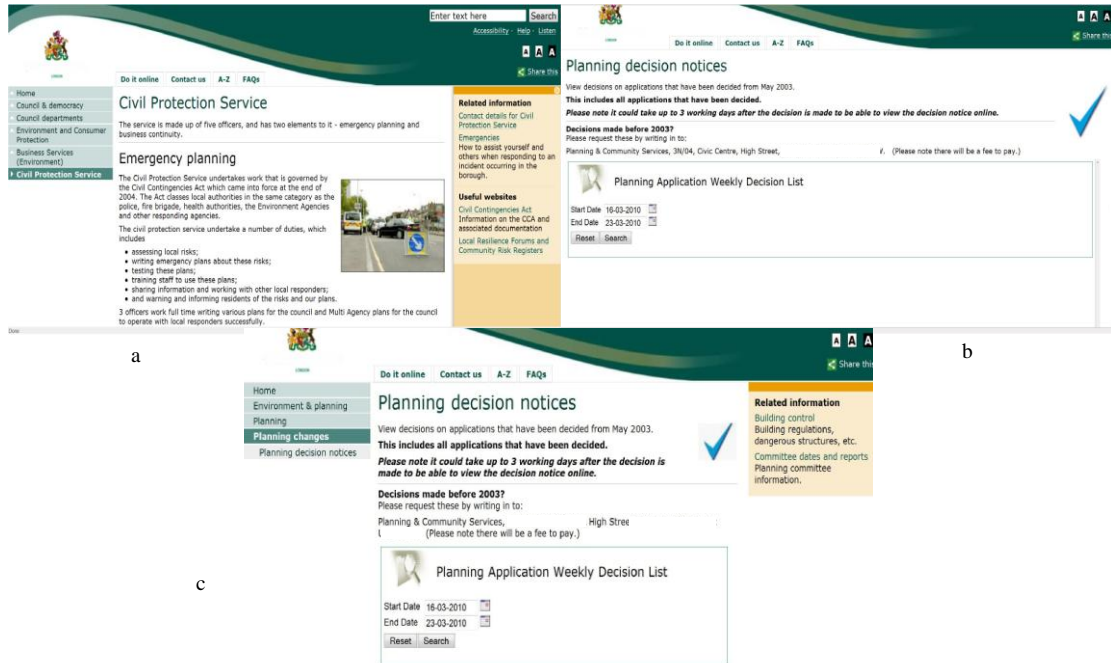
view of the participants on layout consistency in experiments 1 and 2. As shown in Table 7.19, very few participants (8.3%) in experiment 1 think that information is presented with a consistent layout, whereas a majority of the participants (83.3%) in experiment 2 find information presentation with consistent layout in the redesigned London Authority 2.

Table 7.19 Users' perception of layout consistency in experiment 1 and experiment 2

I can easily find information because the consistent layout is used to present information.				
	Experiment 1 (N=12)		Experiment 2 (N=12)	
	N	%	N	%
Strongly disagree	1	8.3%	0	0%
Disagree	4	33.4%	2	16.7%
Neutral	6	50%	0	0%
Agree	0	0%	4	33.3%
Strongly agree	1	8.3%	6	50%
Significance	T= -4.180, P=0.002			

The results show that the participants' assessments of layout consistency are enhanced in experiment 2. As proposed, the design solution that uses the consistent layout pattern has been applied to the redesigned London Authority 2. As shown in Figure 7.11a, generally, the main content is displayed in the central location of a page with the hierarchal menu bar on the left side and related information on the right side. However, on the subpage of planning decision notices, information is presented without consistent layout (Figure 7.11b). Figure 7.11c indicates that the consistent layout pattern is used on this subpage, which may help users to understand that information provided is organised and presented in the same way throughout the site. Based on the findings, the credibility problem of information presentation without consistent layout has been significantly improved by the proposed design solution.

Figure 7.11 Credibility problem 2 in London Authority 2 and the design solution in the redesigned London Authority 2



Finally, with regard to the credibility problem of the absence of security message when users access some confidential information, a significant difference in the participants' assessments is also found between experiments 1 and 2. Table 7.20 presents the view of the participants on security message presentation in experiments 1 and 2. As indicated, the majority of the participants (91.7%) in experiment 1 find that it is difficult to see the security message when they access confidential information. Conversely, all participants (100%) in experiment 2 indicate that the security message is clearly presented when they access confidential information.

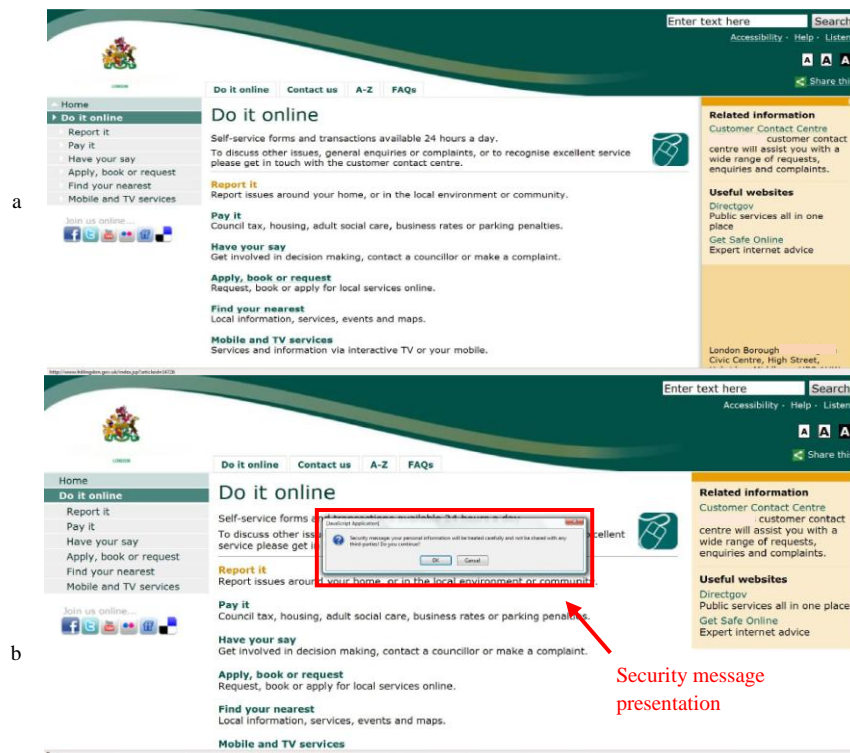
Table 7.20 Users' perception of security message in experiment 1 and experiment 2

A secure message is presented when you access some confidential information.				
	Experiment 1 (N=12)		Experiment 2 (N=12)	
	N	%	N	%
Strongly disagree	0	0	0	0%
Disagree	2	16.7%	0	0%
Neutral	9	75%	0	0%
Agree	1	8.3%	6	50%
Strongly agree	0	0%	6	50%
Significance	T= -6.917, P=0.000			

As designed, a security message, indicating personal data protection information, is presented once users click on any private services in the redesigned London Authority 2. Figure 7.12a indicates an example of London Authority 2 in which there is no

security message when users access an online report service. However, as presented in Figure 7.12b, a clear security message about data protection is presented when users click on the online report service in the redesigned London Authority 2. The results show that the participants' assessments of the security message presentation are significantly improved in the redesigned London Authority 2. Accordingly, this suggests that the proposed design solution has improved the credibility problem of the absence of security message when users access confidential information.

Figure 7.12 Credibility problem 3 in London Authority 2 and the design solution in the redesigned London Authority 2



The redesigned London Authority 3

Table 7.21 shows all the proposed design solutions regarding the identified usability and credibility problems for the redesigned London Authority 3. The results of the proposed design solutions for each identified usability and credibility problem are indicated in the following sub-sections.

Table 7.21 Design solutions regarding the identified usability and credibility problems for the redesigned London Authority 3

London Authority 3	Proposed design solutions
Usability problem 1	Link colours used in London Authority 3 are reduced.
Usability problem 2	Subject categories are arranged in an alphabetical order on each page.

Usability problem 3	The visited links are marked in italics.
Usability problem 4	Drop-down menu for the subject category is designed, which visually hides its sub options. When users move the mouse to the subject category, a type of stretch sub list is used to present the various sub options associated with this subject category.
Credibility problem 1	The contact details are designed into two levels. In the first level, it provides general contact information with an associated link to the detailed level of contact information. In the second level, the detailed contact information will be organised by the different departments of the council.
Credibility problem 2	Awards, such as web and Internet standard awards; best council awards, etc., won by London Authority 3 are presented on the web pages.
Credibility problem 3	A shortcut option is designed on every page within the site, linking the information about the local council. In addition, in order to make such information to be easily found, this shortcut option is consistently located at a fixed place within the site.
Credibility problem 4	A security message is provided, indicating that users' personal information will be treated safely and not be shared with any third-parties. Furthermore, in order to inform users in time, such security message is presented once users click any private services provided by the e-government website.
Credibility problem 5	Visual cues are provided, which indicate the total steps of the task and highlight the current stage that users are engaged in.
Credibility problem 6	A recently updated date is presented on every page.
Credibility problem 7	A sign-in/register option is provided within the site. More specifically, when users access some personal services, the site requires users to sign in or register the service in the first place. After logging into the site, it enables users to continue their tasks.

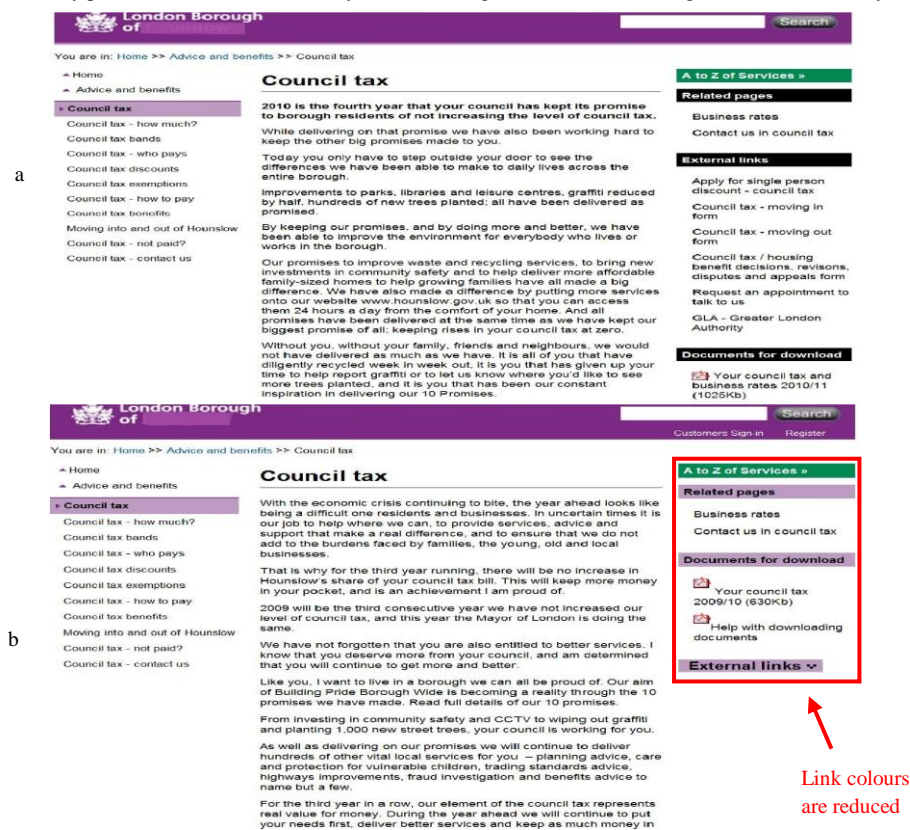
With respect to usability problem 1 that users are confused by links that have many different colours, the results of the Paired-Samples T-test reveal that there is a significant difference in the participants' assessments between experiment 1 and experiment 2. Table 7.22 presents the view of the participants on link colours in experiments 1 and 2. As shown in Table 7.22, half of the participants (50%) feel confusion about links that have many different colours in experiment 1, whereas all participants (100%) in experiment 2 have a negative opinion that it is not confused by links having many colours in the redesigned London Authority 3 website (see Appendix 10c for the detailed Paired-Samples T-test results).

Table 7.22 Users' perception of link colours in experiment 1 and experiment 2

	Experiment 1 (N=12)		Experiment 2 (N=12)	
	N	%	N	%
I am confused with links that have many different colours.				
Strongly disagree	0	0%	4	33.3%
Disagree	1	8.3%	8	66.7%
Neutral	5	41.7%	0	0%
Agree	6	50%	0	0%
Strongly agree	0	0%	0	0%
Significance	T= -8.042, P=0.000			

As proposed, to decrease link colours distraction when users interact with the site, the design solution is to reduce link colours in the redesigned London Authority 3 website. Figure 7.13a presents an example of links that have many different colours in London Authority 3. However, Figure 6.13b shows that some link colours are reduced in the redesigned London Authority 3 website. The results indicate that the participants' assessments of link colours confusion are significantly changed after the design solution has been applied to the redesigned London Authority 3. Therefore, this implies that the usability problem of users' confusion by links having many different colours has been improved by the proposed design solution.

Figure 7.13 Usability problem 1 in London Authority 3 and the design solution in the redesigned London Authority 3



In the usability problem of the subject categories not being presented in a logical order, the results of the Paired-Samples T-test show that there is a significant difference in the participants' assessments between experiment 1 and experiment 2. Table 7.23 shows the view of the participants on the subject categories arrangement in experiments 1 and 2. As shown in Table 7.23, half of the participants (50%) in

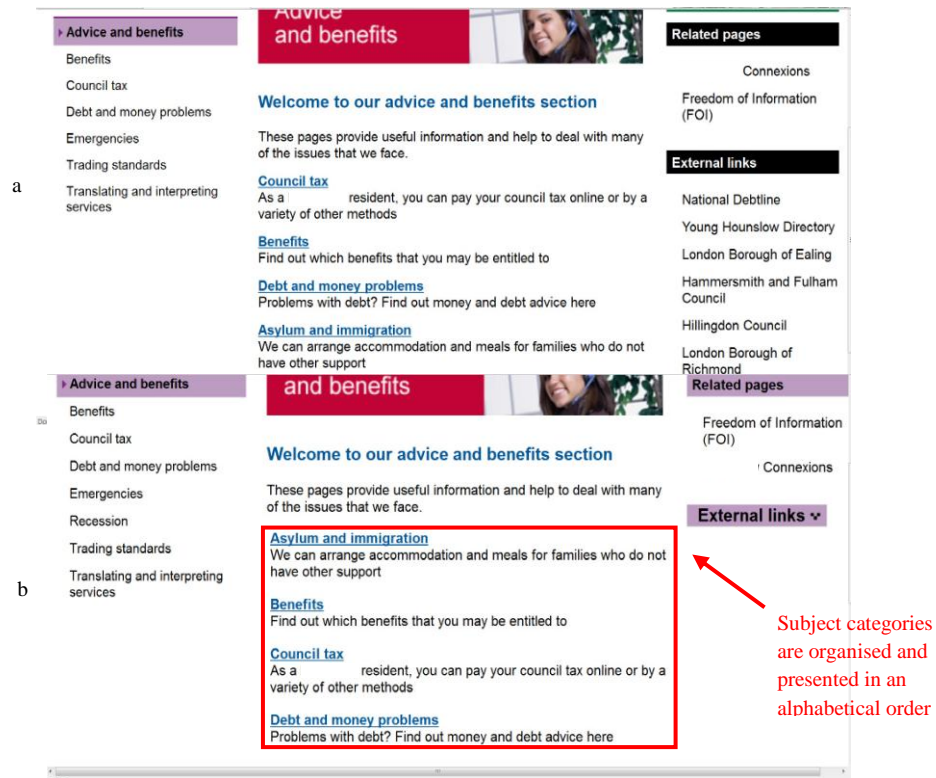
experiment 1 find difficulty in choosing an option due to the options being arranged without a logical order. However, a majority of the participants (91.7%) in experiment 2 assess it differently, indicating that it is not hard to choose an option because the options are now arranged in a logical order in the redesigned London Authority 3 website.

Table 7.23 Users' perception of the order of categories arrangement in experiment 1 and experiment 2

It is difficult to choose the option in subcategories because no logical order of sub options is used in subcategories.				
	Experiment 1 (N=12)		Experiment 2 (N=12)	
	N	%	N	%
Strongly disagree	1	8.3%	3	25%
Disagree	2	16.7%	8	66.7%
Neutral	3	25%	1	8.3%
Agree	6	50%	0	0%
Strongly agree	0	0%	0	0%
Significance	T= -4.000, P=0.002			

As proposed, the design solution is to organise and present the subject categories in an alphabetical order throughout the redesigned London Authority 3. Figure 7.14a shows that initially, the subject categories are randomly presented on London Authority 3. However, Figure 7.14b indicates an example of the subject categories that are organised and presented in an alphabetical order. This helps users understand the overall options arrangement and quickly locate the target subject. The results reveal that the participants' assessments of categories arranged without a logical order are significantly enhanced in experiment 2. Accordingly, it suggests that the proposed design solution has improved the usability problem of subject categories being presented without any logical order.

Figure 7.14 Usability problem 2 in London Authority 3 and the design solution in the redesigned London Authority 3



In the usability problem of visited links not being clearly marked, the results of the Paired-Samples T-test reveal that there is not a significant difference in the participants' assessments between experiments 1 and 2. Table 7.24 presents the view of the participants on visited links in experiments 1 and 2. As shown in Table 7.24, only a few participants (16.6%) can recognise visited links in experiment 1, whereas over half of the participants (66.7%) in experiment 2 can clearly see visited links in the redesigned London Authority 3.

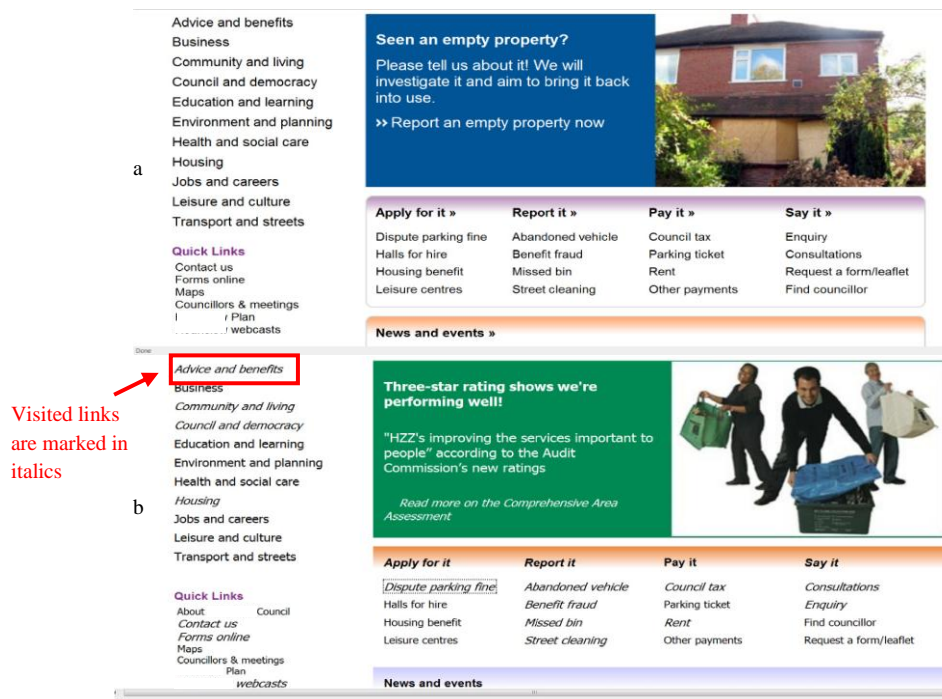
Table 7.24 Users' perception of visited links in experiment 1 and experiment 2

It clearly indicates which choices/links are already visited because they have been marked.				
	Experiment 1 (N=12)		Experiment 2 (N=12)	
	N	%	N	%
Strongly disagree	0	0%	1	8.3%
Disagree	5	41.7%	1	8.3%
Neutral	5	41.7%	2	16.7%
Agree	0	0%	6	50%
Strongly agree	2	16.6%	2	16.7%
Significance	T= -1.685, P=0.120			

To support visited links identification, the design solution that marks visited links in italics has been applied to the redesigned London Authority 3. As shown in Figure

7.15a, initially, the visited links in London Authority 3 have not been clearly marked. However, Figure 7.15b shows that the visited links are clearly marked in italics on the site. Although a significant difference in the participants' assessments is not statistically found between experiments 1 and 2, the results still show that the usability problem of visited links not being clearly marked has been influenced by the proposed design solution.

Figure 7.15 Usability problem 3 in London Authority 3 and the design solution in the redesigned London Authority 3



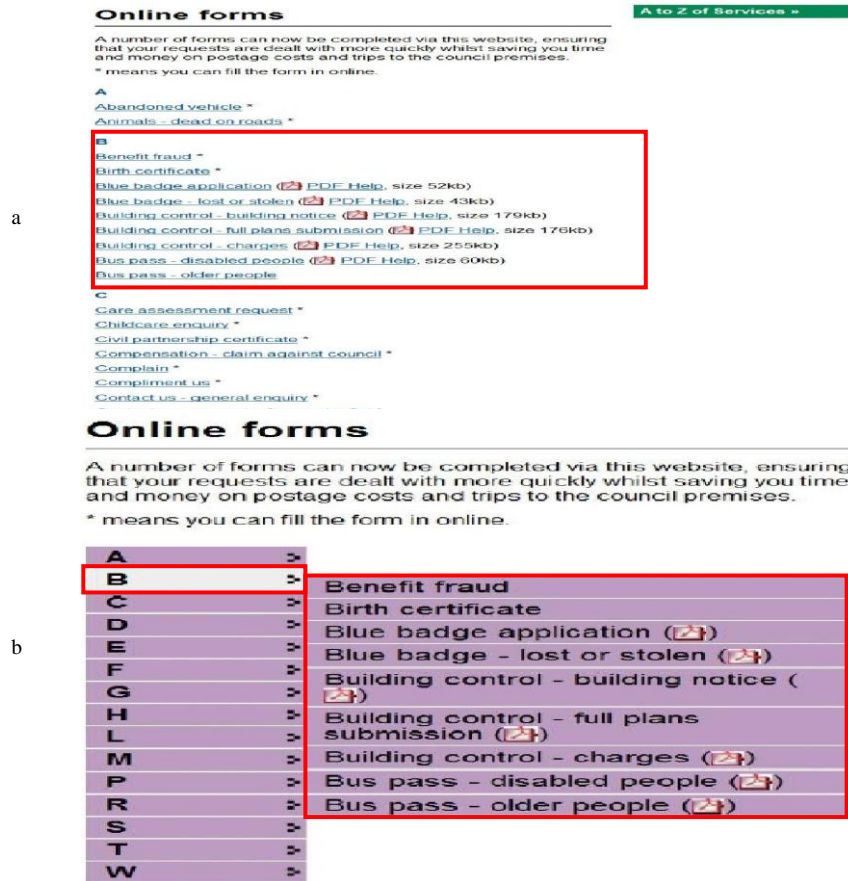
With regard to the usability problem of being given too many choices over sequences, the results of the Paired-Samples T-test find that there is not a significant difference in the participants' assessments between experiment 1 and experiment 2. Table 7.25 shows the view of the participants on the number of choices over sequences in experiments 1 and 2. As shown in Table 7.25, more than half of the participants (58.4%) in experiment 1 have a neutral opinion of being given too many choices over sequences. In contrast, the majority of the participants (66.6%) in experiment 2 present a negative opinion of being given too many choices throughout the redesigned London Authority 3 website.

Table 7.25 Users' perception of the number of options presented on the site in experiment 1 and experiment 2

I sometimes get lost due to being given too many choices over sequences.				
	Experiment 1 (N=12)		Experiment 2 (N=12)	
	N	%	N	%
Strongly disagree	1	8.3%	4	33.3%
Disagree	1	8.3%	4	33.3%
Neutral	7	58.4%	1	8.4%
Agree	3	25%	3	25%
Strongly agree	0	0%	0	0%
Significance	T= -1.567, P=0.145			

In order to reduce the number of the choices over sequences, the proposed design solution is to provide a drop-down menu, hiding some sub choices in relevant categories on every page. This has been applied to the redesigned London Authority 3 website (see Figure 7.16a and 7.16b). Although a significant difference in the participants' assessments is not statistically detected between experiments 1 and 2, the results still indicate that there is a change in the participants' assessments of being given too many choices over sequences from experiment 1 to experiment 2.

Figure 7.16 Usability problem 4 in London Authority 3 and the design solution in the redesigned London Authority 3



In the credibility problem of detailed contact information not being organised by different departments of the council, a significant difference in the participants' assessments is also found between experiment 1 and experiment 2 (see Table 7.26). As indicated in Table 7.26, half of the participants (50%) in experiment 1 find that detailed contact information is not organised by different departments. In contrast, the majority of the participants (66.7%) in experiment 2 assess it differently, showing that they understand the advantages of detailed contact information being organised by different departments in the redesigned London Authority 3 website (see Appendix 10c for the detailed Paired-Samples T-test results).

Table 7.26 Users' perception of detailed contact information presentation in experiment 1 and experiment 2

	Experiment 1 (N=12)		Experiment 2 (N=12)	
	N	%	N	%
Strongly disagree	0	0%	1	8.3%
Disagree	3	25%	7	58.4%
Neutral	3	25%	1	8.3%

Agree	6	50%	3	25%
Strongly agree	0	0%	0	0%
Significance				T= -2.691, P=0.021

As suggested, to support contact information seeking, the design solution is to provide contact detail with two levels of information in the redesigned London Authority 3 website. The first level contains general contact information with an associated link to the detailed level. The second level presents the detailed contact arranged by different departments of the council (Figure 7.17a shows the contact information that is not organised by departments. Figure 7.17b presents an example of the design solution). The results reveal that the participants' assessments in relation to detailed contact arrangement are significantly changed in the redesigned London Authority 3 website. In other words, this suggests that the credibility problem of detailed contact information not being organised by different departments has been improved by the proposed design solution.

Figure 7.17 Credibility problem 1 in London Authority 3 and the design solution in the redesigned London Authority 3

a

Telephoning
Getting to the Civic Centre
Out of hours emergencies
Complaints
Compliments
Customer service standards
Make a suggestion
Find a council building

Contact us

Online

If you would like to ask us a question, or want to know more about one of our services and are not sure who to contact, you can use the simple forms below to make an enquiry.

General enquiry online form
Request a form or leaflet

Once you have sent us your questions, they will be answered by our customer services team. If necessary, your questions will be forwarded to the relevant council department.
You will receive a receipt for your message by e-mail.

Telephone

The main switchboard number and our contact centres are open from 9am to 5pm Monday to Thursday and from 9am to 4.45pm on Fridays. Please dial the following numbers to reach the service you require:

- 020 8583 5555 Environment, street services and planning
- 020 8583 6666 Parking tickets (note that this is automated service and appeals against tickets must be made in writing or via the web. We do not discuss parking tickets by telephone)
- 020 8583 4242 Housing benefit, council tax, council tax benefit

Related pages

Mobile/ PDA website
About Freedom of Information requests
Sign language
Website feedback

External links

Contact your councillor
London Borough of Ealing
Hammersmith and Fulham Council
Hillingdon Council
London Borough of Richmond
Surrey County Council

b

Complaints
Compliments
Customer service standards
Find a council building
Getting to the Civic Centre
Make a suggestion
Out of hours emergencies
Telephoning

Contact us

You are in: Home >> Telephoning

Home
Telephoning

Telephoning

The following numbers will make sure you get through to the right team:

Service	Telephone no.
Business rates	020 8583 5708
Electoral services	020 8583 2828
Housing benefit and council tax	020 8583 4242
Homes	020 8583 4000
Housing	020 8583 3000
Out of hours	020 8583 2222
Parking	020 8583 6666
Pay a parking ticket	0845 1300 555
Pay for other council services	0845 30 10 210
Planning and environment	020 8583 5555
Registrars (births, deaths & marriages)	020 8583 2090
Switchboard	020 8583 2000

The information below is a quick guide of which services are available for these sections.

Detailed contact is organised by different departments

A link to detailed level of contact information

More help with telephoning us

Furthermore, regarding the credibility problem of the site's credentials not being clearly presented, the results of the Paired-Samples T-test indicate that there is a

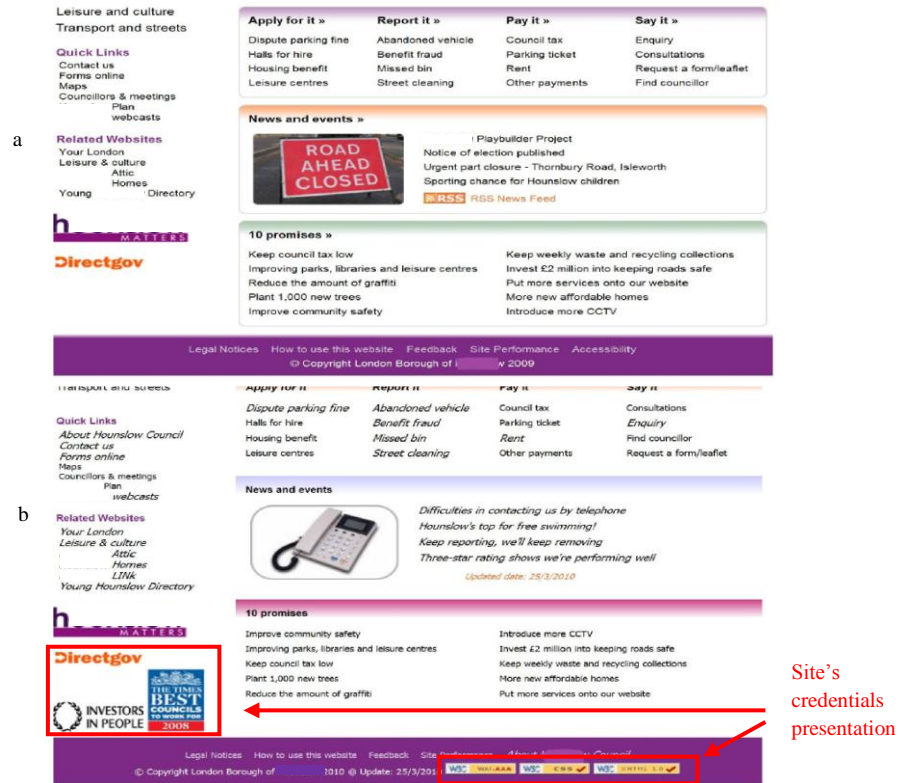
significant difference in the participants' assessments between experiments 1 and 2. Table 7.27 reflects the participants' views on the site's credentials presentation in experiments 1 and 2. As shown in Table 7.27, a number of the participants (41.7%) in experiment 1 feel that it is difficult to see the site's credentials (see Figure 7.18a). In contrast, the participants' perception is significantly changed in experiment 2, in which all participants (100%) can find the site's credentials in the redesigned London Authority 3 website (see Figure 7.18b).

Table 7.27 Users' perception of the site's credentials in experiment 1 and experiment 2

It is clear to see the site credentials because the system displays awards it has earned.				
	Experiment 1 (N=12)		Experiment 2 (N=12)	
	N	%	N	%
Strongly disagree	0	0%	0	0%
Disagree	5	41.7%	0	0%
Neutral	5	41.7%	0	0%
Agree	2	16.6%	9	75%
Strongly agree	0	0%	3	25%
Significance				T= -6.514, P=0.000

To indicate the site's credentials, the proposed design solution is that any awards, such as web and Internet standard awards and best council awards won by the organisation are clearly shown in the redesigned London Authority 3 website in experiment 2. The results show that the participants' assessments of the site's credentials are significantly changed in the redesigned London Authority 3. Therefore, this suggests that the credibility problem of the site credentials not being clearly presented has been improved by the proposed design solution.

Figure 7.18 Credibility problem 2 in London Authority 3 and the design solution in the redesigned London Authority 3



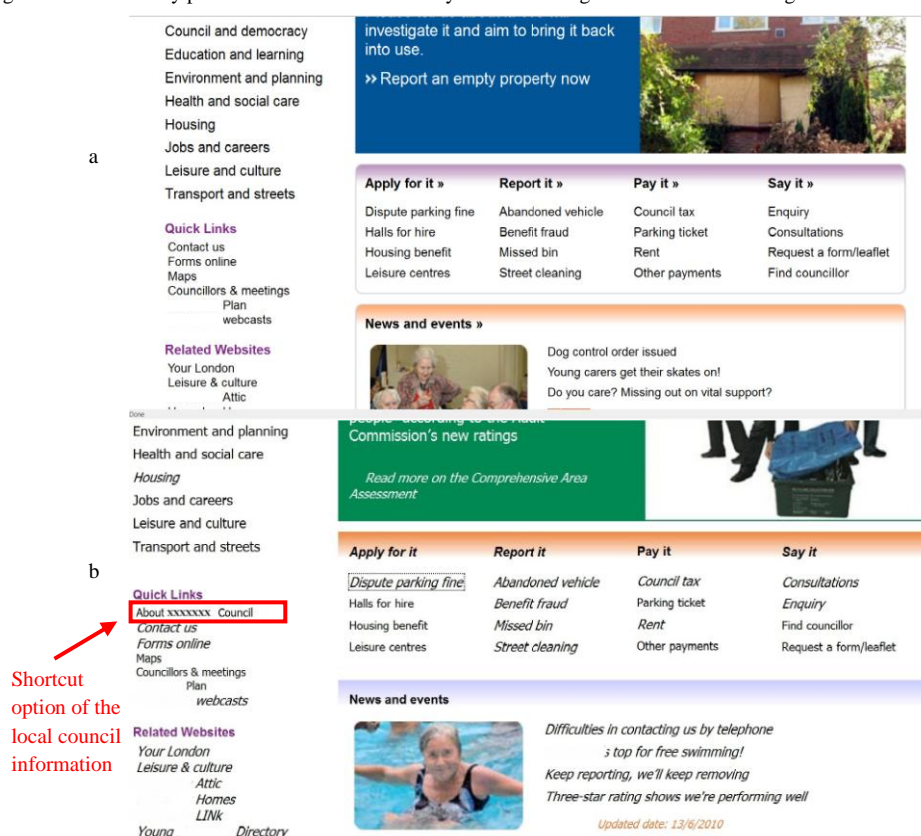
In the credibility problem of the absence of the quick access to the local council information, the results of the Paired-Samples T-test indicate that there is a significant difference in the participants' assessments between experiments 1 and 2. Table 7.28 presents the view of the participants on the quick access to the local council information in experiments 1 and 2. As shown in Table 7.28, a large number of the participants (58.3%) in experiment 1 find a difficulty in locating the local council information (see Figure 7.19a). However, all participants (100%) in experiment 2 can easily find information about the local council on the redesigned London Authority 3 website.

Table 7.28 Users' perception of quick access to council information in experiment 1 and experiment 2

It is difficult to see the information about the local council because the site does not provide a shortcut option.				
	Experiment 1 (N=12)		Experiment 2 (N=12)	
	N	%	N	%
Strongly disagree	2	16.7%	6	50%
Disagree	0	0%	6	50%
Neutral	3	25%	0	0%
Agree	7	58.3%	0	0%
Strongly agree	0	0%	0	0%
Significance	T= -4.214, P=0.001			

As suggested, to make identification of the local council information easier, the design solution is to provide a shortcut option to access the local council information on each page of the redesigned London Authority 3. Figure 7.19b presents an example of the shortcut option of the local council information that is provided in the category of the quick links on the home page. The results show that the participants' assessments about the absence of the quick access to the council information are significantly changed in the redesigned London Authority 3 website. This suggests that the credibility problem of the absence of the quick access to the local council information has been improved by the proposed design solution.

Figure 7.19 Credibility problem 3 in London Authority 3 and the design solution in the redesigned London Authority 3



In the credibility problem that there is no clear security message when users access some confidential information, a significant difference in the participants' assessments between experiments 1 and 2 is also detected. Table 7.29 presents the view of the participants on the security message presentation in experiments 1 and 2. As shown in Table 7.29, only a few participants (16.7%) think that there is a security message when they access private services in experiment 1. On the contrary, all

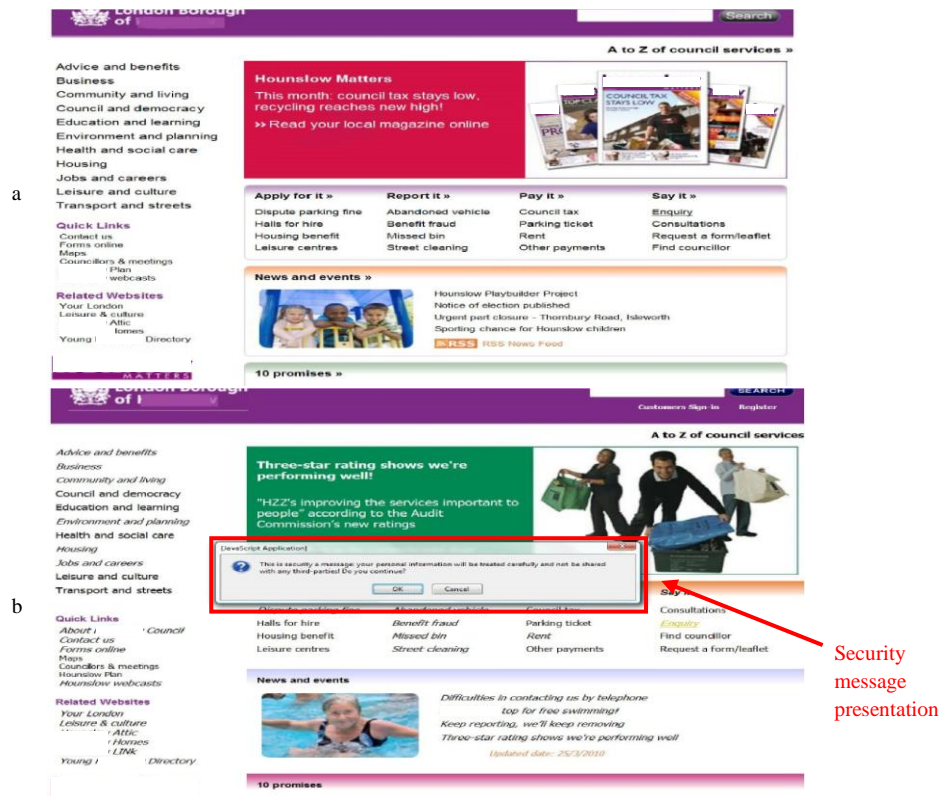
participants (100%) in experiment 2 find a security message when they access confidential services on the redesigned London Authority 3 website.

Table 7.29 Users' perception of security message display in experiment 1 and experiment 2

A secure message is presented when you access confidential information.				
	Experiment 1 (N=12)		Experiment 2 (N=12)	
	N	%	N	%
Strongly disagree	0	0%	0	0%
Disagree	1	8.3%	0	0%
Neutral	9	75%	0	0%
Agree	2	16.7%	7	58.3%
Strongly agree	0	0%	5	41.7%
Significance	T= -5.933, P=0.000			

As designed, when users click on any private services, a security messages, indicating data protection information is shown on the redesigned London Authority 3 website. As shown in Figure 7.20a, initially, there is no security message about data protection when users access the online enquiry services. However, as indicated in Figure 7.20b, a clear security message about data protection is shown on the screen when users access the online enquiry forms. The findings reveal that the participants' assessments of the security message presentation are significantly affected in the redesigned London Authority 3. Accordingly, it appears that the proposed design solution has improved the credibility problem that there is no clear security message when users access confidential information.

Figure 7.20 Credibility problem 4 in London Authority 3 and the design solution in the redesigned London Authority 3



Furthermore, regarding the credibility problem that it is not clear to indicate how much users have done and how much remains when users complete a task, the results of the Paired-Samples T-test reveal that there is a significant difference in the participants' assessments between experiments 1 and 2. Table 7.30 shows the participants' perception of the task progress indication in experiments 1 and 2. As shown in Table 7.30, a small number of the participants (33.3%) in experiment 1 can identify their task progress when they complete a task. Conversely, a large number of the participants (83.3%) in experiment 2 find that the site indicates how much they have done and how much remained when they complete a task on the redesigned London Authority 3 website.

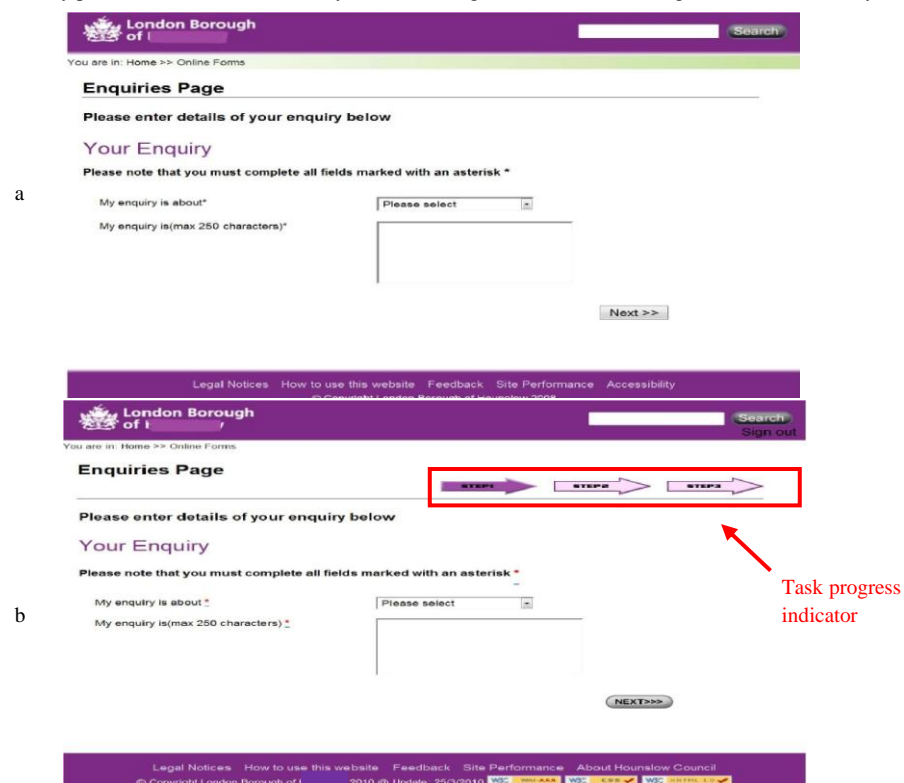
Table 7.30 Users' perception of task progress indication in experiment 1 and experiment 2

	Experiment 1 (N=12)		Experiment 2 (N=12)	
	N	%	N	%
Strongly disagree	1	8.3%	4	33.3%
Disagree	3	25%	6	50%
Neutral	5	41.7%	0	0%
Agree	3	25%	2	16.7%
Strongly agree	0	0%	0	0%

Significance	T= -2.419, P=0.034
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As proposed, the design solution is to provide visual cues that indicate the total steps of the task and highlight the current stage that users are engaged in. As shown in Figure 7.21a, initially, it is not clear how much users have done and how much was left when they complete an online enquiry form. However, as presented in Figure 7.21b, task progress is visually indicated in the online enquiry form. The results show that the participants' assessments of task progress indication are significantly increased on the redesigned London Authority 3 website. Therefore, the proposed design solution has improved the credibility problem of task progress not being clearly indicated when completing tasks.

Figure 7.21 Credibility problem 5 in London Authority 3 and the design solution in the redesigned London Authority 3



With regard to the credibility problem of information about the site update not being clearly presented, a significant difference in the participants' assessments between experiment 1 and experiment 2 is also indicated. Table 7.31 shows the views of the participants on the site update in experiments 1 and 2. As presented in Table 7.31, few participants (25%) in experiment 1 can identify how current the information presented

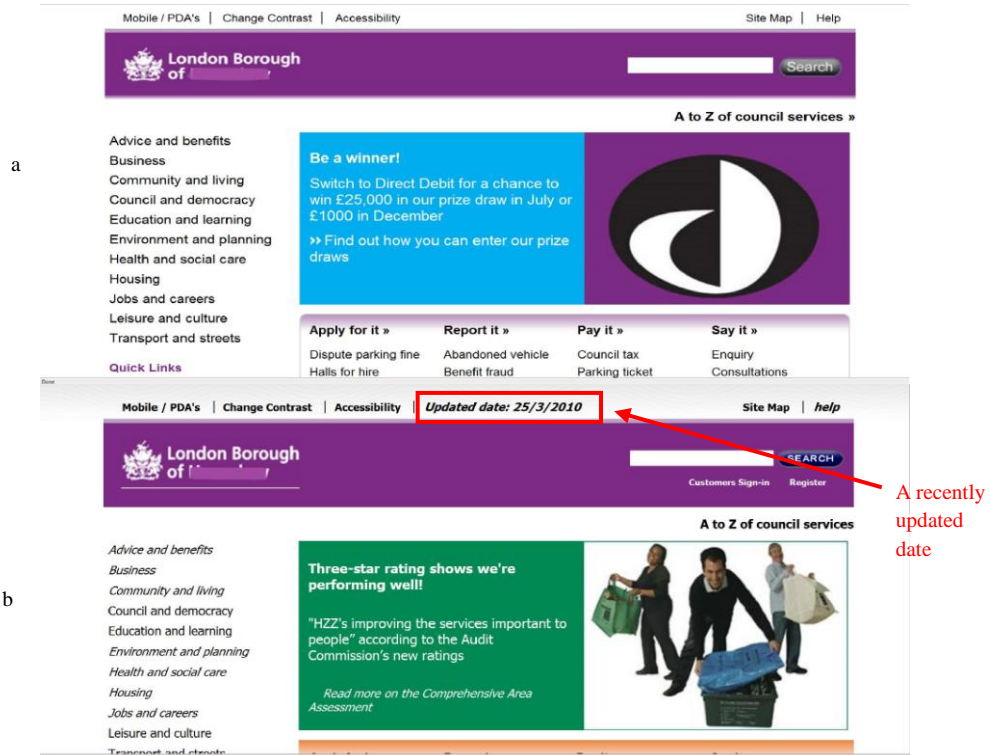
on the site is, whereas all participants (100%) in experiment 2 can easily find the update information on the redesigned London Authority 3 website.

Table 7.31 Users' perception of site update in experiment 1 and experiment 2

It is clear to identify how current the information presented in the site is, because the update date is presented.				
	Experiment 1 (N=12)		Experiment 2 (N=12)	
	N	%	N	%
Strongly disagree	0	0%	0	0%
Disagree	3	25%	0	0%
Neutral	6	50%	0	0%
Agree	1	8.3%	6	50%
Strongly agree	2	16.7%	6	50%
Significance	T= -3.546, P=0.005			

As proposed, the design solution of indicating the update date has been implemented on each page of the redesigned London Authority 3. As shown in Figure 7.22a, initially, the site update is not clearly presented on London Authority 3. Whereas, Figure 7.22b reveals that the site update date is presented at the top of the page within the redesigned London Authority 3. The results show that participants' assessments of site update are significantly improved in experiment 2. Accordingly, this suggests that the proposed design solution improves the credibility problem of the information about the site update not being clearly presented.

Figure 7.22 Credibility problem 6 in London Authority 3 and the design solution in the redesigned London Authority 3



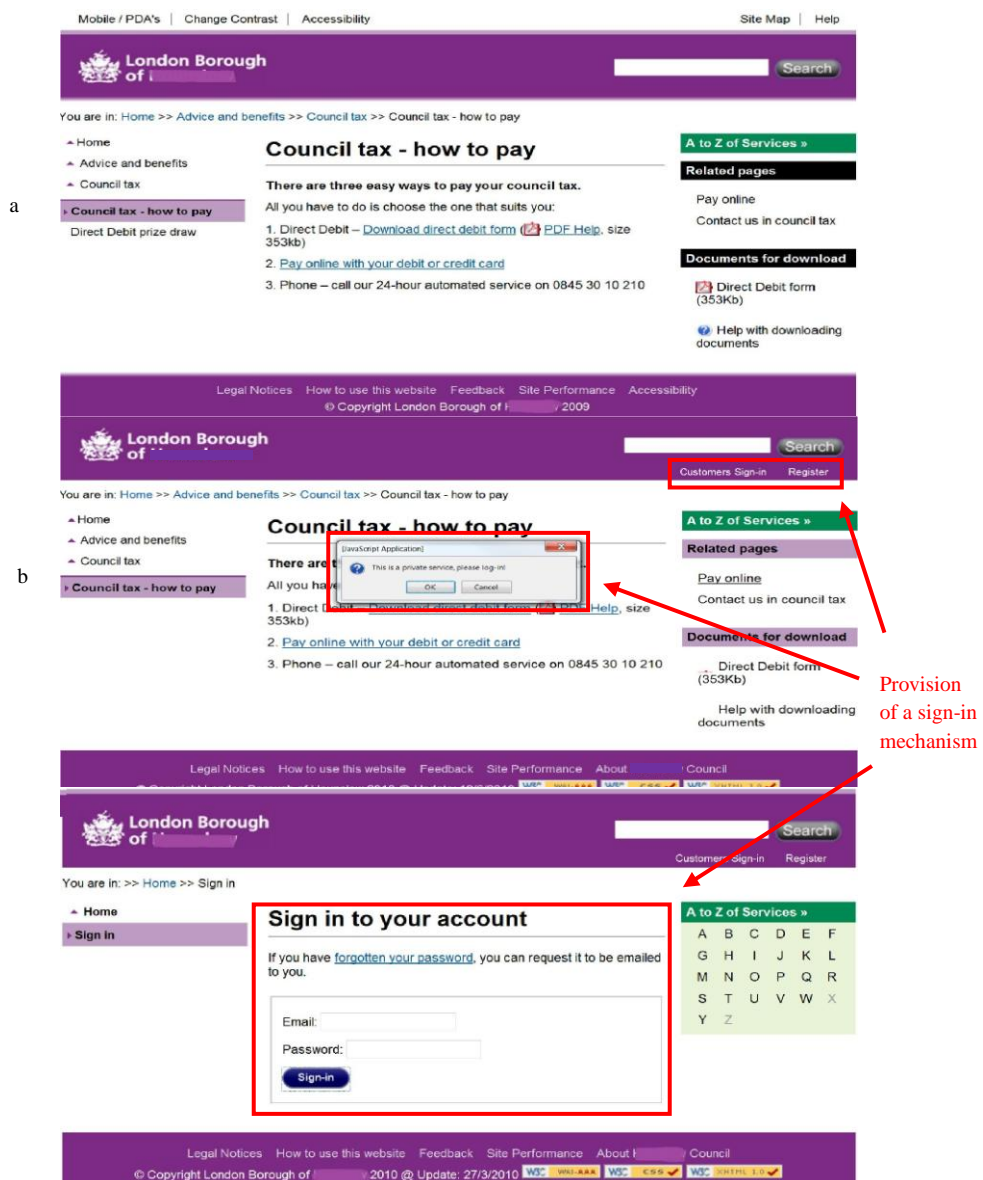
Finally, with regard to the credibility problem of lack of a sign-in option when users access some personal services, a significant difference in the participants' assessments between experiments 1 and 2 is also found. Table 7.32 shows the participants' perception of sign-in options in experiments 1 and 2. As shown in Table 7.32, a small number of the participants (33.3%) in experiment 1 think that there is a sign-in option when they conduct some personal services. However, the participants assess it differently in experiment 2, in which all participants (100%) can find the sign-in option when they conduct their personal services on the redesigned London Authority 3 website.

Table 7.32 Users' perception of a sign-in option in experiment 1 and experiment 2

	Experiment 1 (N=12)		Experiment 2 (N=12)	
	N	%	N	%
Strongly disagree	1	8.3%	3	25%
Disagree	3	25%	9	75%
Neutral	5	41.7%	0	0%
Agree	3	25%	0	0%
Strongly agree	0	0%	0	0%
Significance	T= -3.223, P=0.008			

As indicated, the proposed design solution of providing a sign-in mechanism for all online services has been implemented in the redesigned London Authority 3 website. As shown in Figure 7.23a, originally, it is hard to see a sign-in option when users access the council tax payment service. However, as shown in Figure 7.23b, a sign-in/register approach is used within the site. The results show the participants' assessments of the difficulty of sign-in option recognition are significantly reduced after the design solution has been used in experiment 2. As such, it implies that the credibility problem of a sign-in option not being clearly presented when users access personal services may be improved by the proposed design solution.

Figure 7.23 Credibility problem 7 in London Authority 3 and the design solution in the redesigned London Authority 3



7.3.2 Users' perception: qualitative data

In order to gain an insight into the participants' perception of the proposed design solutions for the redesigned London Authorities, qualitative data is also collected through the open-ended questions to support the questionnaire results. In the open-ended questions, the participants are encouraged to develop their thoughts in-depth and indicate their further comments on the proposed design solutions. Such comments are summarized in the positive and negative categories. This section reports the findings of the frequently recorded comments regarding the proposed design solutions for each redesigned London Authority.

The redesigned London Authority 1

To indicate the participants' further thoughts on the proposed design solutions for the redesigned London Authority 1, the frequently recorded positive and negative comments are summarized in Table 7.33. In terms of the positive comments, a number of the participants address the usability feature of link colours. As proposed (see section 6.2), regarding the usability problem of links having many different colours, the design solution is to reduce link colours on the site. In this way, users may feel comfortable with links interaction and quickly locate information without colours distraction. The following quotes indicate the views of the participants:

“The website is easy to use, and the links colours are very nice, which is useful for me to search for the information.”

“The colours were used in a good way to identify where the link is.”

“There is the limited links colours used, which is helpful for my information seeking.”

“I like that the links do not have too many colours, so that I feel the whole website is in the same colour scheme.”

In addition, some participants positively comment on the credibility feature of colour consistency. As found, with respect to the credibility problem of information presentation without consistent colours, the design solution is to keep the same colour scheme to present information throughout the redesigned London Authority 1. It can build unity across the pages, which help users understand that information provided is

organised and presented in the same way, and quickly locate target information. The following quotes from the participants' responses indicate their views:

"It is clear that colours are consistently used on the site."

"Consistent colours are used to present information on every page, so I can follow such colours to search for information."

"The same colours scheme is applied to each page, which is helpful for the website consistency. Therefore, I could easily recognise my subject information."

"I like that colours are used consistently."

Table 7.33 Users' positive and negative comments on the proposed design solutions for the redesigned London Authority 1

Positive comments on the design solutions
Link colours
Colour consistency
Negative comments on the design solutions
Online help functions indicators

However, in terms of negative comments, some participants present their further thoughts on the usability feature of online help function indicators. Regarding the usability problem of online help not being clearly indicated, the design solution is to offer an online help option, linking user support information, and place this option on a fixed position on each page of the redesigned London Authority 1. Although the online help information become available on the site, some participants still think that the display for the online help option is too small. These quotes from the participants' responses show their views:

"The online help function is available on the site, but the link is too small."

"It would be better if help icon and name can be bigger."

"It is hard to see the online help option because it is too small."

The redesigned London Authority 2

The participants' further thoughts on the proposed design solutions of the redesigned London Authority 2 in presented in Table 7.34. As shown in Table 7.34, the common positive comments focus on the features of marking visited links, arranging search results by level of relevance and security messages presentation. Regarding the usability problem that visited links are not clearly marked, the design solution is to

mark visited links in italics throughout the site. It helps users distinguish which parts of the site they have already visited and which parts remain to be explored. The following quotes from the participants' responses indicate their views:

"The links in italics help to see where I have been before."

"The indication of used links is clear."

"The links that are already visited can be recognized by the italics style."

"I think that marking visited links in italic can help me to see which places I have visited before."

With regard to the credibility problem of search results not being organised by level of relevance, the proposed design solution is to organise search results according to level of relevance, and use visual cues to indicate relevant level for each search item. In this way, users may easily understand the overall arrangement of the search results and quickly locate the relevant item. The following quotes from the participants' responses indicate their views:

"This will be easy to find the information when search results are presented in clear relevance."

"I feel that it is clear and easy to see the level of relevance in search results."

"The five-star rating can help me to identify the information that is the most relevant with my searching purpose."

Table 7.34 Users' positive and negative comments on the proposed design solutions for the redesigned London Authority 2

Positive comments on the design solutions
Marking visited links
Indicating level of relevance for search results
Security messages presentation

With respect to the credibility problem of the absence of security messages in some online services, the proposed design solution is to provide a security message for all private services, indicating that user personal information will be treated safely and not be shared with any third-parties. It can keep users informed of their data protection, which may increase users' perception of data safety and reduce their concerns about losing personal information. The following quotes from the participants' responses indicate their views:

“It is especially important that the website presents the security messages, which is helpful to make credible site. I am pleased to see it on the site.”

“I like that the security message is presented, telling that users' personal details are not being sold on.”

“The indication of the security message will increase my trust, therefore it is good when ethical issues regarding personal information are considered.”

The redesigned London Authority 3

Table 7.35 presents the participants' further thoughts on the proposed design solutions for the redesigned London Authority 3. In terms of the positive comments, the more frequently recorded features are logical order of subject categories arrangement and task progress indication. As suggested, regarding the usability problem of the subject options not being presented with a logical order, the design solution is to arrange the subject categories in an alphabetical order on every page of the redesigned London Authority 3. It helps users understand the overall subject arrangement and supports them to quickly identify target information. The following quotes from the participants' comments indicate their views:

“I like that the category options are in an alphabetical order, so that I can easily find the information among a number of options.”

“Clear category order helps me to get target information quickly.”

“Categories are organized well in the particular order.”

Furthermore, regarding the credibility problem that a task's progress is not clearly indicated, the design solution provides a task status bar, visually indicating the total steps of the task and highlighting the current step that users are engaged in. This increases tasks transparency and support users to measure their task progress. The following quotes from the open-ended questions present their opinions of this design solution:

“The staged approach clearly indicates where I am in a given process.”

“By indicating the task progress, I can easily see how much I have done and how much I have left in the task.”

“I can easily control my progress when I see such task progress indicators.”

Table 7.35 Users' positive and negative comments on the proposed design solutions for the redesigned London Authority 3

Positive comments on the design solutions
Logical order of subject categories presentation
Task progress indication
Negative comments on the design solutions
Difficult recognition of visited links

However, some participants make negative comments on the design solution of marking visited links (see Table 7.35). As suggested, regarding the usability problem that the links already visited are not clearly marked, the design solution is to mark visited links in italics within the site. In such a way, it may help users distinguish which parts of the site have been visited, and which parts of the site remain to be explored. However, some participants find that it is still difficult to recognise visited links in the redesigned London Authority 3 website. The following quotes from the participants' responses indicate their negative views:

“I do not like the italic font because it is not clear to see the difference between unused and used links.”

“Italics are not suitable for visited links in my opinion. I have to pay extra attention to it if I want to see the difference.”

“It is not obvious to see the links in italics on the site.”

7.3.3 Summary of the results in relation to users' perception

Overall, the results of users' perception in experiment 2 indicate that the identified usability and credibility problems has been improved after the proposed design solutions have been applied to the three redesigned London Authorities. More specifically, with respect to the redesigned London Authority 1, quantitative data shows that the participants' assessments of the specific usability problems (including links with many different colours, difficulty of finding the online help function, difficulty of switching between online help and current work) are influenced after the relevant design solutions have been implemented in experiment 2. In addition, the participants' perception of the specific credibility problem (including information presentation without colour consistency) has been also significantly changed in experiment 2. In terms of the qualitative results, it shows the participants positive comments on the proposed design solutions, which supports the findings of the

quantitative results. As such, it suggests that the proposed design solutions have improved the usability and credibility problems identified in experiment 1 in the redesigned London Authority 1 website.

With regard to the redesigned London Authority 2, quantitative data indicates that the participants' assessments of the identified usability problems (including vague options on the home page, links with many different colours, absence of task progress indication, difficult recognition of visited links, skipping over the order of the process) have been significantly improved in experiment 2. Similarly, the participants' assessments of the identified credibility problems (including search results without the level of relevance arrangement, information presentation without layout consistency and no security messages presentation) are enhanced after the proposed design solutions have been applied to the redesigned London Authority 2. In terms of qualitative data, the participants point out their further positive comments on the proposed design solutions, which support the quantitative results. Accordingly, it suggests that the proposed design solutions have improved the usability and credibility problems detected in experiment 1 in the redesigned London Authority 2 website.

Regarding the redesigned London Authority 3, quantitative data reveals that the participants' assessments of the identified usability problems (including links with many different colours, subject categories arrangement without a logical order) have been significantly improved in experiment 2. Moreover, the participants' assessments in relation to the identified credibility problems (including illogical detailed contact information arrangement, lack of the site's credentials display, difficulty of finding the council information, absence of security messages display, absence of task progress indication, difficulty of identifying site update, absence of a sign-in option) have been also improved in experiment 2. However, although no significant difference is found between experiment 1 and 2 with regard to the usability problems that visited links are not clearly marked and users get lost due to being given too many choices over sequences, the results still show that the participants' assessments have been influenced after the design solutions have been applied to the redesigned London Authority 3. Furthermore, the qualitative results indicate the participants further thoughts on the proposed design solutions through the open-ended questions

of the questionnaire, addressing the positive comments on the design solutions in the redesigned London Authority 3. Therefore, it may suggest that the proposed design solutions have improved the usability and credibility problems found in experiment 1 in the redesigned London Authority 3 website.

7.4 Users' performance

The results of users' perception indicate the effects of the proposed design solutions on the identified usability and credibility problems for each redesigned London Authority in experiment 2. In order to investigate the effects of the proposed design solution on users' interaction with the redesign London Authorities, users' performance is also measured on the basis of the same performance criteria used in experiment 1. These criteria include the amount of online help required; time spent completing tasks; number of steps to finish tasks and number of successful tasks completion. By using such criteria, it is helpful to indicate the level of users' interaction with the redesigned London Authorities when they perform a set of practical tasks. Moreover, it can comparatively analyse performance results before and after the proposed design solutions have been implemented in experiment 1 and experiment 2 respectively. This section reports the results of users' performance within each redesigned London Authority.

The redesigned London Authority 1

Table 7.36 presents the participants' performance in terms of total time spent completing tasks; number of steps to complete tasks; amount of online help required and number of successful tasks completion with London Authority 1 in experiments 1 and 2 respectively. As shown in Table 7.36, the results of the Paired-Samples T-test show that there is a significant difference in terms of time spent completing all tasks between experiments 1 and 2 ($T=4.157$, $P=0.002$). More specifically, the participants in experiment 2 take less time to complete the tasks than experiment 1. In addition, a significant difference in terms of number of steps used for all tasks completion is also found between experiments 1 and 2 ($T=4.894$, $P=0.000$). In detail, the participants

take fewer steps to finish all tasks in experiment 2 than experiment 1 (see Appendix 11a for the detailed Paired-Samples T-test results).

Furthermore, the results of the Paired-Samples T-test show that a significant difference in terms of online help required for all tasks and number of successful tasks completion are not shown between experiment 1 and experiment 2. It may be because the distribution of these data sets in experiment 2 does not follow a normal distribution (see section 7.2.2). However, according to the mean scores in terms of online help required for all tasks, it still indicates that the participants in experiment 2 require less online help to complete all the tasks than experiment 1. Similarly, based on the mean scores in terms of number of successful tasks completion, it shows that the participants in experiment 2 can complete more tasks successfully than experiment 1.

The results indicate that participants' performance with the redesigned London Authority 1 is enhanced in experiment 2. These findings are also reflected in the results of users' perception, which indicates that the identified usability and credibility problems are improved by the proposed design solutions in the redesigned London Authority 1 website in experiment 2. Therefore, this implies that the proposed design solutions have increased the overall usability and credibility of the redesigned London Authority 1, which in turn is reflected in better users' performance with the redesigned e-government website.

Table 7.36 Users' performance with the redesigned London Authority 1

Total time spent completing tasks		
	Experiment 1 (N=12)	Experiment 2 (N=12)
Mean	26.627	15.427
Std. Deviation	8.905	2.494
Significance	T=4.157, P=0.002	
Number of steps to finish tasks		
	Experiment 1 (N=12)	Experiment 2 (N=12)
Mean	60.417	41.167
Std. Deviation	13.104	4.648
Significance	T=4.894, P=0.000	
The amount of online help required		
	Experiment 1 (N=12)	Experiment 2 (N=12)
Mean	0.250	0.000
Std. Deviation	0.452	0.000

Number of successful tasks completion		
	Experiment 1 (N=12)	Experiment 2 (N=12)
Mean	1.139	1.000
Std. Deviation	0.117	0.000
Significance	T= N/A, P= N/A	

The redesigned London Authority 2

Table 7.37 shows the participants' performance in terms of total time spent completing tasks; number of steps to accomplish tasks; amount of online help required and number of successful tasks completion with London Authority 2 in experiments 1 and 2 respectively. As shown in Table 7.37, a significant difference in terms of time spent completing all tasks is found between experiments 1 and 2 ($T=5.489$, $P=0.000$). In other words, the participants in experiment 2 use less time to complete all tasks than in experiment 1. Additionally, a significant difference in terms of number of steps used for all tasks completion is also detected between experiments 1 and 2 ($T=6.878$, $P=0.000$). More specifically, the participants in experiment 2 take fewer steps to finish all the tasks than in experiment 1 (see Appendix 11b for the detailed Paired-Samples T-test results).

However, the results of the Paired-Samples T-test show that a significant difference in terms of online help required for all tasks and number of successful tasks completion is not shown between experiments 1 and 2. A possible explanation is that the distribution of these data sets does not follow a normal distribution (see section 7.2.2). However, according to the mean scores of online help required for all tasks, it emerges that the participants in experiment 2 require less online help to complete all the tasks than those in experiment 1. Equally, although a significant difference in terms of number of successful tasks completion is not seen, it still shows that the participants in experiment 2 complete more tasks than those in experiment 1.

The findings show that the participants' performance with the redesigned London Authority 2 is promoted in experiment 2. These findings are also echoed in the results of users' perception, which reveals that the participants' assessments of the specific usability and credibility problems are improved in the redesigned London Authority 2

in experiment 2. Accordingly, the findings suggest that the proposed design solutions improve the overall usability and credibility of the redesigned London Authority 2, which in turn, enhances users' performance.

Table 7.37 Users' performance with the redesigned London Authority 2

Total time spent completing tasks		
	Experiment 1 (N=12)	Experiment 2 (N=12)
Mean	21.721	8.803
Std. Deviation	8.579	1.796
Significance	T=5.489, P=0.000	
Number of steps to finish tasks		
	Experiment 1 (N=12)	Experiment 2 (N=12)
Mean	81.833	40.917
Std. Deviation	20.687	5.160
Significance	T=6.878, P=0.000	
The amount of online help required		
	Experiment 1 (N=12)	Experiment 2 (N=12)
Mean	0.583	0.000
Std. Deviation	0.669	0.000
Significance	T= N/A, P= N/A	
Number of successful tasks completion		
	Experiment 1 (N=12)	Experiment 2 (N=12)
Mean	1.148	1.000
Std. Deviation	0.086	0.000
Significance	T= N/A, P= N/A	

The redesigned London Authority 3

Table 7.38 presents the participants' performance with London Authority 3 and the redesigned London Authority 3 in experiments 1 and 2 respectively. As shown in Table 7.38, the results of the Paired-Samples T-test indicate that there is a significant difference in terms of time spent completing all tasks between experiment 1 and experiment 2 ($T=2.523$, $P=0.028$). More specifically, the participants in experiment 2 take less time to complete the tasks than in experiment 1. Moreover, a significant difference in terms of number of steps used for all tasks completion is also found between experiments 1 and 2 ($T=2.046$, $P=0.065$). In detail, the participants in experiment 2 take fewer steps to finish all the tasks, compared with experiment 1 (see Appendix 11c for the detailed Paired-Samples T-test results).

In terms of online help required for all tasks, the results of the Paired-Samples T-test show that a significant difference is not seen between experiments 1 and 2. It may be because the distribution of these data sets does not follow a normal distribution (see section 7.2.2). However, according to the mean scores, it seems that the participants in experiment 2 require less online help to complete all the tasks than in experiment 1. Similarly, although a significant difference in terms of number of successful tasks completion is not shown between experiments 1 and 2, the mean scores also indicate that the participants in experiment 2 finish more tasks than those in experiment 1.

Based on these findings, it appears that the participants perform better in experiment 2 than experiment 1. These are also reflected in the results of the participants' perception, which shows that the participants' assessments of the identified usability and credibility problems are improved in experiment 2. Consequently, it implies that the proposed design solutions have enhanced the overall usability and credibility of the redesigned London Authority 3, which in turn, enhances users' performance.

Table 7.38 Users' performance with the redesigned London Authority 3

Total time spent completing tasks		
	Experiment 1 (N=12)	Experiment 2 (N=12)
Mean	16.209	10.009
Std. Deviation	8.102	2.334
Significance	T=2.523, P=0.028	
Number of steps to finish tasks		
	Experiment 1 (N=12)	Experiment 2 (N=12)
Mean	50.167	40.333
Std. Deviation	16.297	4.141
Significance	T=2.046, P=0.065	
The amount of online help required		
	Experiment 1 (N=12)	Experiment 2 (N=12)
Mean	0.000	0.000
Std. Deviation	0.000	0.000
Significance	T=N/A, P=N/A	
Number of successful tasks completion		
	Experiment 1 (N=12)	Experiment 2 (N=12)
Mean	1.065	1.000
Std. Deviation	0.088	0.000
Significance	T= N/A, P= N/A	

7.5 Summary and conclusion

Experiment 2 aims to examine the effects of proposed design solutions on the usability and credibility problems found in experiment 1 for each target e-government website. To conduct the assessment of the proposed design solutions, both users' perception and performance are measured in experiment 2. Overall, the findings of users' perception show that the assessments of the participants on the specific usability and credibility problems on each redesigned London Authority have been significantly improved after the proposed design solutions have been implemented in experiment 2. In other words, these proposed design solutions may improve the usability and credibility problems found in experiment 1 for each target e-government website. Furthermore, the results of users' performance show that the level of the participants' interaction with each redesigned London Authority in experiment 2 is better than their interaction in experiment 1. Thus, it may suggest that the improved usability and credibility may influence users' performance. More specifically, the proposed design solutions have solved the usability and credibility problems in the target London Authorities. These improved usability and credibility features may increase the overall usability and credibility of the redesigned e-government websites, which in turn, enhances users' performance with these redesigned e-government websites. This is also supported by previous studies (Baker, 2009; Garcia et al., 2005; Verdegem and Verleye, 2009), which indicated that improved e-government website usability can enhance service effectiveness and users' satisfaction, and then improve users' interaction. Furthermore, Wathen and Burkell, (2002) showed that more credible websites encourage users' trust and attitudes and behaviour development, which can enhance users' performance with websites.

Therefore, it is important to ensure that usability and credibility of e-government websites meet the requirements of the users, so that users' interaction with e-governments may be enhanced. To achieve this goal, this study draws on the results of experiments 1 and 2 to develop a set of usability and credibility guidelines. These guidelines can help designers identify existing usability and credibility problems and provide design guidance for usability and credibility development for e-government

websites. Thus, the next chapter describes the detailed usability and credibility guidelines for e-government website design.

CHAPTER 8

GENERAL DISCUSSION AND GUIDELINES DEVELOPMENT

8.1 Introduction

The aim of this study is to evaluate the usability and credibility of current e-government websites, which has been achieved through two experimental studies. Chapter 5 presents the findings of experiment 1 in terms of users' perception and users' performance. Regarding users' perception, a set of usability and credibility strengths have been found in the target e-government websites. In addition, there are a number of usability and credibility problems that have been identified in each e-government website evaluated. With respect to users' performance, the level of users' interaction with the e-government websites evaluated has also been indicated. To provide a thorough usability and credibility evaluation, the proposed design solutions regarding the identified usability and credibility problems have been provided and designed into the target e-government websites in Chapter 6. Chapter 7 reports on the results of experiment 2 to indicate the effects of the proposed design solutions on the usability and credibility problems found in experiment 1. The purpose of Chapter 8 is twofold: a) to provide a general discussion of the findings of experiment 1 and experiment 2; b) based on the results of the two experiments, to develop a set of usability and credibility guidelines for e-government website design, which is focused on developing more user-centred e-government.

This chapter is structured as follows: section 8.2 provides a general discussion of the findings from experiment 1 and experiment 2, which are based on the analysis presented in Chapter 5 and Chapter 7. Then, a set of usability and credibility guidelines is developed to guide the usability and credibility design of e-government websites (section 8.3). Finally, a brief summary and conclusion is presented at the end of the chapter (section 8.4).

8.2 General discussion of the findings from experiments 1 and 2

8.2.1 Discussion of the results from experiment 1

The findings from experiment 1 indicate that usability and credibility issues have been considered in current e-government websites because a set of usability and credibility strengths have been found. In particular, the common usability strengths lay within the areas of “visibility of system status”, “consistency and standards” and “support and extend users’ skills”. For example, regarding visibility of system status, a title on every page clearly indicates the relevant subject. In terms of consistency and standards, each page always follows the same display format. With regard to support and extend users’ skills, the site supports users moving forwards and backwards within different fields on the site. Furthermore, the common credibility strengths are within the areas of “site looks professional”, “easy to verify the information accuracy” and “use restraint with any promotional content”. For instance, regarding the site looks professional, the content of the site matches with information that users expect to obtain from a local council. In terms of ease of verifying the information accuracy, the URL properly presents the domain name of the local council. With respect to use restraint with any promotional content, the site does not present too many irrelevant promotion contents. These identified usability and credibility strengths are important features to establish usable and credible e-government websites.

On the other hand, there are a number of usability and credibility problems that have been found in each target e-government websites. These findings reinforce previous usability or credibility studies of e-government, which suggest that there is much room for current e-government websites to improve their usability and credibility (Gant and Gant, 2002; Garcia et al., 2005; Sidi and Junaini, 2006). In particular, among the usability and credibility problems detected, the most serious usability problems identified in the target e-government websites are within the areas of “aesthetic and minimalist design”, “recognition rather than recall” and “consistency and standards”. For example, regarding aesthetic and minimalist design, the links have many different colours on the site. With respect to recognition rather than recall, some options on the home page are not clearly presented. In terms of consistency and standards, subject categories are presented in an illogical order. In addition, the

credibility problems with highest severity are within the areas of “site looks professional”, “make site easy to use and useful” and “show the honest and trustworthy people behind the site”. For instance, with respect to the site professional look, information is presented without consistent colours. Regarding the site ease of use and usefulness, search results are not organised and presented by level of relevance. In terms of showing honest and trustworthy people behind the site, the detailed contact information has not been organised by the different council departments, and it is not clear to see the e-government website’s credentials. These problems suggest that usability and credibility have not been considered in adequate detail in these current e-government website designs. The findings are also supported by previous studies (Barnes, 2004; Donker-Kuijjer et al., 2010; Kossak et al., 2001; Kumar et al., 2007), which show that usability and credibility have not had enough attention paid to them in e-government, especially e-government website design. Without addressing usability and credibility in sufficient detail to inform e-government website design, the target of increasing users’ interaction with e-governments remains a challenge. Therefore, this implies that current e-government websites need to improve their usability and credibility.

The results from experiment 1 also reinforce previous findings on the link between usability and credibility (Fogg et al., 2001; 2003; Garcia et al., 2005; Nielsen, 1999; 2000), which implies that there is an interrelation between them. The findings of the study indicate that the e-government website with the best overall usability is associated with the best overall credibility, and vice versa. Equally, the e-government website that has the lowest overall usability is associated with the lowest overall credibility, and vice versa. These results suggest that usability and credibility have mutual effects, and there is a need to consider both usability and credibility together when developing e-governments.

Furthermore, the results of users’ performance reinforce previous research, which indicate that there is a relationship between users’ perception and their performance (Han et al., 2001; Sonderegger and Sauer, 2010). Based on the experimental results, it appears that the overall users’ perception of usability and credibility positively influences their performance with the e-government websites. This is also supported by Sauer and Sonderegger (2009), who indicated that users’ perception of usability

influences users' attitude, emotion and behaviour. In addition, Rains and Karmikel (2009) indicated that users' perception of credibility significantly affects users' performance and their interaction with the systems.

Moreover, the results show that users' performance is not only influenced by the overall users' perception of usability and credibility, but also affected by the particular perception of usability and credibility, especially the e-government website look. This is also supported by previous studies, which indicate that the website aesthetics design provides the first impression in users' perception. As reported by Lavie and Tractinsky (2004), aesthetics is strongly correlated with perceived usability, which is a key determinant of users' satisfaction and pleasure. This is also supported by an early study by Tractinsky (1997), who found that system aesthetics can be seen as apparent usability, which is perceived more quickly than other attributes of usability. Additionally, Fogg et al. (2003) identified that the most prominent issue found in credibility evaluation is site look, which can cause users most concern about credibility. More importantly, users' judgments of credibility are also firstly based on site look. As suggested by Robins and Holmes (2008), the first impression of credibility comes from the site look, which results in a faster judgment of credibility compared with other credibility cognitive processes. Therefore, the findings imply that users' perception of usability and credibility can be affected by a number of design features. Any specific features violation can influence users' perception, which in turn affects users' interaction with the site. Therefore, in the construction of usability and credibility of e-governments, it is important to pay attention to the specific usability and credibility features at the detailed level.

8.2.2 Discussion of the results from experiment 2

Experiment 2 has examined users' perception of the proposed design solutions regarding the usability and credibility problems in relation to the redesigned e-government websites. In addition, users' task performance with the redesigned e-government websites has also been measured in order to reveal the level of users' interaction. Overall, the results indicate that there is a significant difference in users' perception of the specific usability and credibility features between experiment 1 and

experiment 2. In addition, a significant difference has been also found in users' performance between experiments 1 and 2. More specifically, in terms of users' perception, the findings show that users' perception of the usability and credibility problems in each target e-government website is significantly alleviated after the proposed design solutions have been implemented in the redesigned e-government websites in experiment 2. In other words, it may imply that the identified usability and credibility problems have been improved by the proposed design solutions. This is also supported by the qualitative results in experiment 2, which reveal the users' positive feedback about the improved usability and credibility features. These results suggest that with precise problems analysis and appropriate solutions design, the usability and credibility problems of current e-government websites can be enhanced. Such enhancement will be beneficial for the overall usability and credibility of e-government websites.

In addition, the results of users' performance show that the level of users' interaction with each redesigned e-government website in experiment 2 is better than their interaction with the target e-government websites in experiment 1. Based on these results, a possible explanation is that the proposed design solutions have improved the usability and credibility problems of the target e-government websites. Such improvements may lead to the increase in the overall usability and credibility of the target e-government websites, which in turn, makes it better for users' performance with these e-government websites. These results confirm previous studies, which indicate that usability or credibility significantly influence users' attitudes and behaviour (Al-Omari and Al-Omari, 2006; Bélanger and Carter, 2008; Donker-Kuijjer et al., 2010; Parent et al., 2005; Sidi and Junaini, 2006; Thompson et al., 2003; Welch and Hinnant, 2003). In particular, a higher level of usability may produce better users' performance (Zabed Ahmed et al., 2006). As a result, usability and credibility are two important factors influencing users' interaction with e-governments. Furthermore, these results also suggest the efficacy of the users' perspective evaluation. In this way, it can focus on users' viewpoints to identify usability and credibility problems, examine the proposed design solutions and measure their task performance, which is helpful to understand users and their usability and credibility needs. The results can provide a concrete prescription for developing more user-centred e-government that

may expect to support users to achieve the desirable service outcomes, and generate greater users' participation.

8.3 Usability and credibility guidelines development

Given that a number of usability and credibility problems have been found in the target e-government websites, it indicates that usability and credibility have not been considered in adequate detail in e-government website design. In other words, it suggests that the designers do not pay enough attention to usability and credibility of current e-governments, and lack the knowledge to develop consistently usable and credible e-government websites. Based on the findings of the usability and credibility evaluation, this section provides a set of guidelines that address the specific usability and credibility design features for e-government website development.

The importance of the guidelines is that they can provide a framework that supports designers in creating quality design (Henninger, 2000). As such, many guidelines for interface and website design have been indicated in previous studies (Reed et al., 1999; Rosenweig, 1996; Weinschenk and Yeo 1995), and evidence from literature has demonstrated the usefulness of such guidelines for the effective design of computer-based systems. In this research, with the proposed sets of usability and credibility guidelines (see Tables 8.1 and 8.2), designers can have a better understanding of the users' requirements for usability and credibility. In addition, each guideline covers a number of specific design features, which provides designers with concrete guidance when they design usability and credibility e-government websites. As indicated by Henninger (2000, p.228), "the more specific the guideline, the better the support for the developer." Furthermore, these guidelines can be also used to help designers in evaluating usability and credibility of existing e-government websites, based on whether the website design meets these guidelines, with the final goal being to achieve more usable and credible e-governments. These guidelines are generated from associated usability heuristics and credibility guidelines used in the study, containing a range of the design considerations. The design considerations reflect the existing successful features, the problems identified and the proposed design solutions in

experiment 1 and experiment 2. The following sections present the detailed description of the usability and credibility guidelines.

8.3.1 Usability guidelines development

Usability guideline 1: E-government websites should provide users with a high level of status visibility to support their information seeking.

The results indicate that when users travel around e-government websites, they usually scan the page titles or subject headings to identify information rather than reading through the detailed level of information content. They need to have clear subject headers and page titles to support quick information processing. Therefore, the subject headers and page titles should be clearly displayed to represent the corresponding content.

During information seeking, users require visibility of the option selected and its relation within multiple category levels. In order to make information easy to remember and identify, the option selected and its relevant multiple levels of options need to be visually labelled and consistently applied across pages.

Furthermore, when users search the target information via the screen, their attention is moved from one part of content to another part. In order to support information identification, different kinds of content should be separated from each other and clearly located in distinct zones on an e-government website.

During interaction, users rely on navigational tools to help them in getting the object needed and informing where they have been and where they currently are. Accordingly, in order to keep users informed of their current position within the site and support site orientation, e-government websites should visualize users' current location and alternative movements relative to the structure of the underlying information space.

In the course of information seeking, users select relevant options through multiple category levels to locate their target information. Thus, in order to make options easily

identifiable, an e-government website should present meaningful options and ensure that options and sub options are interdependent.

Usability guideline 2: E-government websites should match with the real world, speaking users' language with words and concepts familiar to users.

When interacting with e-government services, users need to be aware of the system reaction. In particular, the system needs to notify users if there are observable delays in the system response time. Therefore, in order to keep users informed of the system progress, e-governments should display clear processing status messages for users, including delay time and how much more/longer there is to go.

Users compare the colours used between e-governments and local councils. They expect that the same colour scheme can be consistently applied on both e-government representation and physically in local councils. Consequently, in order to satisfy users' expectation of colour application, colours used in e-government websites should correspond to the colour scheme in physical local councils, including logo colours and header colours.

At every time during the interaction, users need to be aware of how to proceed with their actions. In order to make the action easily understandable for users, e-government websites should offer clear prompts to indicate how the action is to be conducted at all times.

Users follow links to identify the target information. In order to make links readily understood, link names should be descriptive, meaningful and explicit to represent information provided. In addition, using relevant images with links can support users' subject understanding and facilitate text readability.

Usability guideline 3: E-government websites should support users' free movement and ensure that undo and redo functions are available.

Users search for information or complete tasks by using different approaches, such as following through multiple levels of menus, or using a search engine. In order to give

users the freedom to select their preferred approach to locate information or conduct tasks, e-government websites should allow users to revise their selected approach or change earlier options whenever they want. Meanwhile, an undo function should always be available for users during interaction.

Users move around e-government websites to locate target information. In particular, going back to the previous pages is an important part of personal control and a way to organise a searching strategy. As such, to allow users to go back and review previous information, e-government websites should provide and highlight the back option on every page, to further support information hunting.

Subject options arrangements influence users understanding of the overall information arrangement. In order to make a sensible way for users to look through subject information and reduce memory load, subject options should be arranged in a logical order to indicate a natural sequence of information organization.

Information breadth and depth are used to distribute e-government content by designing the number of subject categories and the number of information levels. The appropriate number of categories keeps content from getting cluttered and reduces the chance of users being confused by a vast number of options. With the proper levels of information, users can follow a short path through the site to find the detailed information. Therefore, a medium condition of breadth and depth should be considered as an optimal trade-off, which can help with information retrieval.

Usability guideline 4: E-government websites should have consistent design, and users should not have to wonder whether different words, presentations, or actions mean the same thing.

Colour consistency establishes unity across the pages of an e-government website, strengthening visual subject recognition and reducing layout clutter. In order to help users understand that information provided is organised and presented in the same way throughout the site, consistent colours should be used throughout the e-government site.

In addition, having consistent layout within an e-government website strengthens the structural relations among elements. In order to maintain consistency throughout their websites, e-governments should follow consistent standards in terms of font, size and display formatting for interaction design.

In the course of information seeking, users may require online help to solve their problems. In order to make online help instructions easy to identify, online help options should appear in a consistent location across the pages within the site.

Moreover, to reinforce consistency and reduce cognitive load on users, menu choices should be named consistently, both within each menu and across pages of e-government websites.

Usability guideline 5: E-government websites should design better error messages that prevent a problem from occurring in the first place.

During the online tasks completion, users are required to fill in information in each step of the task. In order to reduce the possibility of errors occurring and ensure that all necessary information is provided, e-government websites should not allow users to skip over the order of the task process.

When errors have been made in data entry fields, there is a need to inform users in order to correct these errors. As such, to draw users' particular attention to errors, e-government websites should show a highlighted message around errors in data entry fields.

Furthermore, users need to be aware of the requirements in data entry fields, such as the character spaces limitation in order to input right data. To make clear and understandable data entry fields to prevent errors, the requirements of data entry should be clearly presented on every page where possible.

During the interaction with tasks, in order to ensure that users have completed the appropriate information, e-government websites should present a warning message if users are making a potentially serious error.

Usability guideline 6: E-government websites should make objects, actions and options visible and users should not have to remember information from one part of the dialogue to another.

Since a range of information is presented on each page of an e-government website, in order to make information easy to recognise and decrease cognitive load on users, the key information or subject should always be placed in a central location on the pages.

When users conduct tasks from the home page, in order to support users' orientation and increase users' understanding of menu choices, a corresponding prompt should be presented to briefly explain every choice on the pages.

Moreover, in order to support text readability on e-government websites, breathing space should be appropriately used in text areas.

Usability guideline 7: E-government websites should support tasks completion and speed up interaction for both experienced and inexperienced users.

Hyperlinks connect the text, pages and documents of e-government websites, serving as a function that guides users' movement around the site in order to locate their target information. To reduce the barriers to information connection, all sorts of links within e-government websites should be working properly, and link to corresponding information.

Users select the relevant options through multiple levels of information to locate the target subject. In order to make sub options easy to understand and identify, e-government website should provide detailed information in multiple options levels.

When looking through the search results, users need to establish their understanding of subject arrangement sequence. In order to help users quickly identify their searching object and reduce memory load problems, search results should be arranged according to the level of relevance and such relevance should be visually presented for users.

Sometimes, users are task-orientated when they travel around e-government websites. In order to cater for quick task interaction, e-government websites should provide shortcuts or quick links for highly frequent usage tasks on the site.

Users require the appropriate hierarchy structure to fit in with their progressive level of sub-tasks to complete the overall tasks. Therefore, in order to navigate users' movement to achieve the desirable tasks, e-government should match menu structure with task structure within its site.

Usability guideline 8: E-government websites should provide aesthetic and minimalist design.

When users look at more specific subject content, images can support their awareness of topics and facilitate communication of the subject information. In order to make images easily understandable for users, e-government websites should apply clear images. In addition, such images should be closely linked with corresponding text.

When users read information on e-government websites, the appropriate amount of information displayed can keep content from getting cluttered and reduce the chance that users are confused by information heavy subjects. Therefore, content on each e-government page should be presented in an uncluttered manner.

During information searching, users need to recognise the visited and unvisited places to fit in their searching strategy to locate their target information. Consequently, to clearly distinguish between visited and unvisited links, they should be clearly marked and indicated, for adding support to users' information searching process.

Users need to distinguish the differences among information resources to locate expected information. In order to support users' recognition of information resources, distinct colours should be applied for the links. However, in order to integrate links colours to the overall layout aesthetic display, and reduce unnecessary colours distraction, the number of link colours should be carefully considered.

When users look through e-government websites, it is critical to lead their eyes in the appropriate direction on subject content. Therefore, white space should be used to separate meaningful groups of information and create symmetry in content display.

Usability guideline 9: E-government websites should provide error messages that precisely indicate the problem and constructively suggest a solution.

During interaction with e-governments, users may make some mistakes when completing online forms. In order to help users to recover from errors to achieve their desirable services outcomes, e-government should provide clear error messages that suggest what further actions users need to take to overcome errors.

In addition, users need to know the reasons behind the errors in order to avoid such errors in the following process. Therefore, to effectively deliver the causes of the problems, error messages should be meaningful, constructive and unambiguous.

When filling in information in data entry fields, users are required to provide some crucial information. In order to prevent missing data, the compulsory and optional fields should be clearly marked for users.

If an error is detected in a data entry field, in order to attract users' attention to the particular field in error and avoid retyping all information, e-governments should place the cursor in that problem field and highlight the error without changing other initial data.

Usability guideline 10: E-government websites should provide help and documentation to support users' tasks completion.

During interaction, users may check online help to know how best to use an e-government website. In order to make associated information easily understandable for users, e-government should give guidance in clear and simple language.

Users may require online help to support their tasks completion at any time. In order to ensure that users can easily find online help whenever they need, e-government

websites provide quick access to online instruction on every page. Furthermore, in order to make such help access easily detected, it should be always located in a fixed position on pages.

When users access online help, they expect to find the relevant answers to solve the problems encountered on e-government websites. In order to increase problem solving capability, online help instruction should cover a wider range of guidance and advices.

In the course of multiple tasks process, users need to easily retrieve their previous task after using online help information. In order to allow users to easily switch between online help and their current work, online help information should be distinctly presented in a separated window within e-government websites.

Usability guideline 11: E-government websites should make service functions, design elements and site content work as a whole to support users' tasks completion.

In order to support users' tasks completion, e-governments should increase their collaboration ability in order to understand the abbreviations, acronyms, codes and formats used by users.

E-government should define standard communication protocols to support information and services exchange.

Users' first impression comes from the site look. Thus, in order to make an attractive site for users, e-governments should ensure that displays on each page are compatible throughout their websites.

Usability guideline 12: E-government websites should support, extend and improve users' skills and knowledge when they perform tasks.

E-government is used by diverse users who have heterogeneous skills. In order to make the key options highly visible, subject options should stand out clearly on each page of the e-government website.

In addition, users with different skills take different lengths of time to read information. In order to make information quick to understand and identify, e-government websites should summarize the most important content at the beginning of the paragraph, following the detailed information.

All users need to easily control their information pace within an e-government website. Therefore, in order to increase control of movement around e-government websites, forward and backward functions should be made available in all fields of e-governments.

Usability guideline 13: E-government websites should present a pleasant design and treat users with respect.

Users prefer to use relevant images with text, which can enrich content presentation and facilitate communication. Therefore, in order to keep enjoyable interaction with information presentation, relevant images should be presented throughout the site.

In addition, users are happier reading short information. As a result, in order to make content easy to read, e-governments should make text short without reducing depth of content, by splitting the information into multiple nodes connected by links. Furthermore, information on each page should be written in clear and simple language.

When users interact with e-government websites, they may have different requirements in terms of access. In order to increase the quality of interaction, e-government websites should provide accessibility options consistently on every page.

Table 8.1 Summary of usability guidelines

Usability guideline heading	Design consideration	Interpretation
1. Visibility of the website status	To display clear subject headers and page titles	To make content quick to understand and identify
	To label the option selected and its relevant multiple levels of options	To make options readily understandable for users information seeking
	To display different kinds of information in distinct zones	To draw users' attention to information seeking
	To track users navigational path and highlight current position within the site	To keep users informed of their current position in interaction process
	To present meaningful options To ensure that options and sub options are interdependent	To make options easy to identify
2. Match between the site and the real world	To consistently provide processing status message	To keep users informed of the system progress
	To apply the same colour scheme between e-governments and physical governments	To meet users' expectation of colours
	To provide clear prompts to indicate processing information at all times	To make the action easily understandable for users
	To provide descriptive, meaningful and explicit link names To use relevant images to support links presentation	To allow links to be readily understood
3. User control and freedom	To allow users to revise their selected approach To allow users to change earlier options To make undo function always available for users	To give users the freedom to select their preferred approach in information seeking
	To provide and highlight the back option on every page	To allow users to go back and review previous information
	To arrange subject options in a logical order	To make subject options easy to remember and identify To reduce users' memory load
	To provide a medium condition of information breadth and depth	To support information retrieval
4. Consistency and standards	To apply consistent colours throughout e-government websites	To make information presented easily recognised
	To provide consistent layout in terms of font, size and formatting	To maintain the overall consistency of e-government website
	To present online help options in a consistent location on every page	To make online help options easily identified
	To consistently name menu choices across pages	To reinforce consistency and reduce cognitive load on users
5. Errors prevention	To not allow users to skip over the order of the task process	To reduce the possibility of errors occurring To ensure the provision of all necessary information
	To show a highlighted message around errors in data entry fields	To make errors easily identified for users

	To indicate the requirements of data entry on every page where possible	To prevent errors To clarify data entry fields for completing correct data
	To present a warning message if users are making a potentially serious error	To make sure that users complete appropriate information
6. Recognition rather than recall	To locate key information/subject in a central position on every page	To make information/subject easy to recognise and identify To decrease cognitive load on users
	To offer clear and brief prompts for choices explanation	To support site orientation To increase users' understanding of menu choices
	To appropriately use breathing space in text areas	To help users in text readability
7. Flexibility and efficiency of use	To ensure that all links are accessible, and link to relevant information	To reduce the barriers to information connection
	To provide detailed information in multiple options levels	To make sub options easy to understand and identify
	To arrange search results according to level of relevance To visually display the level of relevance	To make searching items quickly identified To reduce memory load problems
	To provide shortcuts or quick links for highly frequent usage tasks	To cater for quick tasks interaction
	To match menu structure with task structure within the site	To navigate users' movement to achieve tasks
8. Aesthetic and minimalist design	To apply clear, simple and meaningful images within corresponding text	To make images easily understandable for users
	To present content in an uncluttered manner	To increase content readability
	To mark visited links	To distinguish between visited and unvisited places
	To provide links with different colours	To recognise resources differences
	To offer an appropriate number of link colours	To reduce unnecessary colours distraction
	To use appropriate white space to separate information groups, and create symmetry in content display	To lead users' eyes in the appropriate direction on subject content
9. Help users recognize, diagnose and recover from errors	To present clear error messages to suggest further actions	To recover from errors
	To show meaningful, constructive and unambiguous error messages	To effectively deliver the causes of the problems to users
	To mark compulsory and optional data entry fields	To prevent missing data
	To highlight an error in particular field without changing other original data	To attract users' attention on an error To avoid retyping information
10. Help and documentation	To give guidance in clear and simple language	To make help information easily understandable for users
	To provide a quick online help access on every page where possible To always locate help in a fixed position on pages	To ensure that users can easily find online help whenever they need To make online help access easily identified

	To provide online help instruction covering a wider range of guidance and advices	To increase problem solving capability
	To open a separated window to present online help information	To allow users to easily switch between online help and current work
11. Interoperability	To increase collaboration ability to understand the abbreviations, codes and formats used	To support tasks completion
	To define standard communication protocols	To support information and services exchange
	To ensure that different displays on each page are compatible	To make attractive site for users
12. Support and extend users' skills	To make subject options stand out on each page	To make the key options highly visible
	To present the most important content at the beginning of the paragraph	To make information quick to understand and identify
	To make forward and backward functions available in all fields of e-governments	To increase control of movement around the site
13. Pleasurable and respectful interaction with users	To offer relevant images with text	To keep enjoyable interaction with information presentation
	To make text short To write information in clear and simple language	To make content easy to read
	To provide accessibility options and consistently indicate it on every page	To increase the quality of interaction

8.3.2 Credibility guidelines development

Credibility guideline 1: Since the overall impression builds the initial credibility, therefore e-government websites should be designed in a clean and professional layout that fits with its purpose of giving a good first impression.

When users access the site, content is the focus of users' attention. Indeed, users first look at the main content area of the page and judge what the page is about. Therefore, in order to make quality content for users, content displayed on e-government websites should match with information users expect to obtain from a local council.

During information searching, users need to clearly identify relevant information among a number of subject options. In order to distinguish information between subject options, colour should be used to group related information.

When following the links to locate objects across pages, users need consistent layout, strengthening visual subject recognition and reducing content clutter. Consequently, in order to establish the unity throughout the site and support information identification, e-government websites should use consistent colours in information presentation.

Users use subject categories to narrow down subject topics for searching purposes. In order to support quick and accurate information identification, information should be logically categorised into subject groups and distinctly presented.

The indication of the relationship between pages is required by users in information processing. Therefore, in order to clearly distinguish pages relationship, e-government websites should visually label every page on the site.

Credibility guideline 2: E-government websites should make information accuracy and easy to verify.

While reading information across pages, in order to make information easily understandable by users, e-government websites should present information at the right level of detail on each page.

E-government websites should provide third party references to support information presented and prove that information comes from a trusted source.

Among subject arrangement, users require a sequence of information organization to support quick subject searching. Therefore, in order to allow users to easily scan and locate the relevant subject among a number of subject options, subject options should be arranged in a logical order, for example, an alphabetical order.

The category name is the first thing users look at before they choose information. It enables information selection to meet the target subject. Accordingly, in order to locate appropriate subject information, it is necessary to provide the category name that matches with information presented in a page.

Users can use the URL as a visual reference to decipher information source. They need comprehensible URLs to verify information location. Therefore, in order to make the URL more easily understandable by users, e-governments should use common natural language words to present the URL, indicating the protocol specification and the domain name.

Credibility guideline 3: E-government websites should provide information to prove that the government organization is real and legitimate, for example, detailed government background and clear contact details.

Users are encouraged to contact the e-government organisation to obtain timely responses to their questions. Therefore, in order to meet users contact needs, multiple contact methods should appear on every page of e-government websites.

E-governments need to show the real people working behind the site, who convey their trust through images and text. As such, the role of users and staff in e-

government services should be described in online documentation, names and images of people who supply the services should be presented on the site.

Furthermore, in order to advertise e-governments credits and recognition, e-government should make references to other governmental bodies by providing links and listing logos on the site.

Credibility guideline 4: E-government websites should highlight their organisational expertise in the content and services provided.

Service policies are important whenever information is being collected about users' services. In order to make service policies readily understandable and increase trust, e-government should specify service policies information at a detailed level.

Users prefer information presented with legitimacy. In particular, information needs to convey a sense of authority. In order to make reliable information for users, e-government should provide precise, detailed and honest information with source references and dates whenever possible.

During interaction with e-government services, users need messages/prompts to help them complete the services. Therefore, in order to allow messages/prompts to be readily understood for users, messages/prompts displayed should be complete and concise.

Credibility guideline 5: E-government websites should show that there are honest, trustworthy people working behind the site.

E-government needs to introduce itself to improve users' understanding. Therefore, in order to make such introduction information available for users, there is a need to provide clear links; for example an "About us" page to present information in terms of political balance, major committees and government services.

In addition, presenting e-government's credentials can increase users' trust. Therefore, e-government websites should make references by showing any awards that the organization has earned, or listing credits from government partners.

Moreover, users need to be aware of the people who work behind e-government to provide information and services. Therefore, in order to enhance staff recognition, e-government websites should provide as detailed as possible description for staff, with standard photos.

Credibility guideline 6: E-government websites should provide contact details to give the impression that there are people available to help queries.

During interaction, users are warmly welcomed to contact e-governments whenever they need. Therefore, in order to make contact information easy to identify, a quick contact option should always be presented and in a fixed position on every page.

Moreover, in order to make contact information convenient for users, e-government should provide multiple types of contact information, such as address, phone, email and feedback forms.

When users look for detailed contact information, there is a need to help them quickly locate the relevant information. Therefore, in order to make contact information easy to identify, detailed contact information should be arranged in a logical order on the site, for example, organising contact information by different departments.

Credibility guideline 7: E-government websites should provide a friendly interface that is easy to use and help users to complete their tasks.

When users conduct their specific tasks, they can develop their own way to complete the task. Therefore, in order to make the site easy to use, e-government websites should provide multiple functions to support users' tasks completion, such as quick links, services directories and a search engine.

While interacting with e-government, users need to identify their current location in a services process. Therefore, in order to keep users informed of their service position, e-government should provide messages to indicate where the users are within the site.

In addition, during all tasks, in order to indicate to users how much remains to complete, e-government websites should break down steps required to complete the task, and highlight current steps completed in the process.

When using the search engine, the search results page should have a sorted list showing the best hits at the top. Therefore, in order to make search results easy to remember and locate, the search results should be organised by the level of relevance, and such level of relevance should be visually indicated for users.

Credibility guideline heading 8: E-government websites should provide evidence that the content on the site is timely.

Updated information is valuable to users and should be clearly indicated as current. Therefore, in order to indicate that information and services provided on the e-government website is maintained regularly and kept up-to-date, the site update date, and information and services update date should be clearly presented through visual cues on e-government websites.

Credibility guideline 9: E-government websites should show restraint with any promotional content.

During information seeking, users need to focus their search on subject information. Therefore, in order to maintain users' subject attention, the amount of promotional content should be restrained.

In addition, in order to allow subject content to be easy to distinguish, promotional content should be grouped and presented in non-important areas.

Credibility guideline 10: E-government websites should avoid all types of errors.

When users fill in online forms, in order to reduce the likelihood of errors occurring, e-government websites should provide proper instructions for users.

In addition, in order to support users' movement around the site to find the target information, e-governments should ensure that all links on the site can properly connect to corresponding pages.

When users read information on every page, in order to prevent misunderstanding, e-government websites should use clear, simple language without typographical errors.

Credibility guideline 11: E-governments should indicate government transparency through the site.

An open e-government is required by users. In order to develop e-government transparency, in-depth government information, such as public expenditure and budgetary execution should be provided on an e-government website.

Additionally, users may be concerned with data protection and copyright policy when they interact with e-governments. In order to make such information available for users, e-government should provide a clear option linking terms and disclaimer information.

After completing online services, users need to be informed about online transaction confirmation. Therefore, in order to show that an online service has been completed, e-government should send a clear confirmation message at the end of the process.

At every time during users' online services, users need to feel in control. In order to allow users to check their action progress, e-government websites should clearly indicate task status within services, using visual cues.

Credibility guideline 12: E-government websites should provide agile services to support users' tasks completion.

Users have their own strategies for searching for information and to complete tasks on e-government websites. In order to meet the different requirements of users, all functions of e-government websites should work as a whole to support users to work at their own pace.

In addition, users select categories and subcategories to find the target information. In order to allow users to identify relationships among categories, information should be organised in a hierarchical way that matches with users' searching structures.

Furthermore, in order to avoid users getting stuck on e-government services, an e-government website should show the way out for users to exit the services at any time.

Credibility guideline 13: E-governments should protect users' privacy and services security.

At every point when users interact with personal services and information, their services need to be protected. Accordingly, in order to ensure that protected areas are secure, e-government websites should provide password allocation mechanisms for users' authentication.

During information transaction, users can be concerned about whether their personal information is treated safely. Thus, in order to make transaction processes understandable for users, e-government websites should show a data protection message before transferring data.

In order to protect confidential information, a warning message should be presented on e-government sites if users are allowed to access confidential services.

Table 8.2 Summary of credibility guidelines

Credibility guideline heading	Design consideration	Interpretation
1. Site looks professional	To display content that matches with information users expect to obtain from a local council	To make quality content for users
	To employ colours to group related information	To distinguish information among subject options
	To use consistent colours in information presentation	To build unity through the site to support information identification
	To logically categorise information into subjects group and distinctly present	To support quick and accurate information identification
	To visually label every page where possible	To clearly distinguish pages relationship
2. Easy to verify the information accuracy	To present information at the right level of detail on every page	To make information easily understandable for users
	To provide third part references	To support information source authority
	To arrange subject options in an alphabetical order	To make users to easily scan and locate the relevant subject
	To provide the category name that matches with information presented in a page	To locate appropriate subject information
	To use common natural language words to present the URL	To make URL easily understandable for users
3. Show a real organization behind site	To show multiple contact methods on every page	To meet users contact needs
	To describe the role of users and staff To present staffs' names and images	To show the real people working behind the site
	To make references to other governmental bodies by providing links and listing logos	To advertise e-governments credits and recognition
4. Highlight the expertise in your organization and in the content and services provided	To specify services policies information at a detailed level	To make service policies readily understandable To increase trust
	To provide precise, detailed and truthful information with source references and dates	To make reliable information for users
	To display messages/prompts in completeness and conciseness	To allow messages/prompts to be readily understood
5. Show honest and trustworthy people behind your site	To provide "About us" information	To make introduction information available for user
	To make references to other government agencies To display any awards earned by the organization	To form users' trust
	To provide detailed staff information with proper photographs	To enhance staff recognition
6. Make it easy to contact the e-government	To offer a quick contact option on every page	To make contact information easy to identify
	To provide multiple types of contact	To make contact information convenient for users

	To organise contact information by different departments	To make contact information easy to identify
7. Make site easy to use and useful	To provide multiple functions to support users' tasks completion	To make site easy to use
	To provide messages to indicate where users are within the site	To keep users informed of their service position
	To break down steps required to complete tasks To highlight current step completed in the process	To indicate to users how much remains to complete
	To arrange search results in the level of relevance To visually present the level of relevance	To make search results easy to remember and locate
8. Update site's content often	To indicate site update date To present information and services update date	To support users to judge information/services quality
9. Use restraint with any promotional content	To limit the number of promotional content	To maintain users' subject attention
	To present promotional content in non-important areas	To allow subject content easy to distinguish
10. Avoid errors of all types	To provide proper instructions for users	To reduce the likelihood of errors occurring
	To ensure that all links properly connect to corresponding pages	To support users' movement to find target information
	To use clear, simple language without typographical errors	To prevent misunderstanding for users
11. Transparency	To provide in-depth government information	To develop e-government transparency
	To provide a clear option linking terms and disclaimer information	To make data protection and copyright policy information available for users
	To send a clear confirmation message at the end of the process	To confirm that an online service has been finished
	To indicate task status using visual cues	To allow users to check their action progress
12. Service agility	To ensure that all functions of e-government work as a whole	To meet the different requirements of users
	To organise information in a hierarchical way	To identify relationships among categories
	To show the way out for users to exit the services at all times	To avoid users getting stuck on e-government services
13. Privacy and security	To provide password allocation mechanism for users' authentication	To ensure that protected areas are secure
	To indicate a data protection message before transferring data	To make transaction processes understandable for users
	To present a warning message if users are allowed to access confidential services	To protect confidential information

8.4 Practical issues in guidelines implementation

Furthermore, in order to address their validity, the usability and credibility guidelines have been reviewed by three professionals who are working in one of the local authorities (one person is an e-government website senior designer; two of them are e-government developers). Their feedback indicates that the guidelines are clear, specific, understandable and applicable. They cover a range of usability and credibility features in relation to e-government website design and are useful and helpful. Therefore, it is possible that they could apply these guidelines to e-government website evaluation in the real world.

However, in order to implement these usability and credibility guidelines successfully, there are some aspects that need to be considered. Firstly, senior members of the organisation, such as senior managers or senior designers responsible for e-government, need to develop a sound plan, in which user-centred design is critical. In other words, users need to be involved in e-government development. Secondly, when the guidelines are used for designing a new e-government website, designers need to present and explain these guidelines to users at the detailed level and ask users to check whether these guidelines can meet their usability and credibility requirements. Designers should carefully consider users' comments and feedback and address the particular needs of the guidelines in the e-government website design. In this way, it can reflect the utility of these guidelines as flexible references. Thirdly, in the process of e-government website design, if the specific design elements conflict with each other, for example, the design element that information should be organised in a hierarchical way that matches with users' searching structure might contradict with users having their own strategies for searching for information. In other words, it is impossible to get a structure that matches with all users. In this way, designers should consider the circumstances under which the specific design feature should be followed. In addition, a balance must be found between obligatory design features and providing an adequate amount of flexible design features for designers. Furthermore, designers should use their previous experience or good examples to judge the specific design needs. Fourthly, when the guidelines are used for evaluating an existing e-government website, the evaluation results can generate two design options. One is to produce a

new e-government website and another one is to redesign the e-government website based on the existing e-government website. The final decision mainly depends upon the number of problems detected. When producing a new website, designers can develop an initial prototype to address all the problems found in the existing e-government website and carry out a heuristic evaluation and performance measure of the initial prototype. The results can be used to improve the initial prototype. If finance allows, this improvement can be conducted as an interactive process until a refined website design is achieved.

8.5 Summary and conclusion

This chapter provides a general discussion of the results from experiment 1 and experiment 2. The results from experiment 1 indicate a number of usability and credibility problems that have been identified in the target e-government websites, and these usability and credibility problems influence users' interaction. Based on the findings, it suggests that usability and credibility have not been paid enough attention in e-government development. Therefore, it has been argued that there is much room to improve usability and credibility of the target e-government websites. To improve the identified usability and credibility problems, the proposed design solutions are provided and examined in experiment 2. The results from experiment 2 imply that the usability and credibility problems have been improved by the proposed design solutions. Such improvements suggest the increase of the overall usability and credibility of the target e-government websites, which in turn, makes it better for users' performance with these e-government websites evaluated.

Based on the analysis of the findings from the two experiments, a set of usability guidelines and a set of credibility guidelines are developed to guide designers in e-government website design. These guidelines can help effective e-government website design, by addressing usability and credibility combinations at the detailed level. In addition, these guidelines can also be used to help designers in evaluating usability and credibility of existing e-government websites, based on whether the

website design meets these guidelines, with the final goal being to develop more usable and credible e-governments.

CHAPTER 9

CONCLUSIONS

9.1 Introduction

This research aims to evaluate the usability and credibility of current e-governments, focusing on specific e-government websites in the UK. To accomplish this aim, this research employs heuristic evaluation and performance measurement to identify usability and credibility problems in existing e-governments and provide design solutions to improve the identified problems. The purpose of this chapter is to summarise this research, which is structured as follows: section 9.2 reflects the overall ideas of the thesis. Section 9.3 reviews the research questions set in Chapter 1. Then, the contributions of the research are presented in section 9.4 and section 9.5 discusses the limitations and reflection on the research. Finally, potential future studies are suggested in section 9.6.

9.2 Research summary

With the rapid development of the Internet and web technology, e-government is becoming more widespread in the public sector and makes significant attempts to deliver government information and services to users. Users have increasingly been able to interact with e-governments by searching for government information and accessing government services without time and space limitations. However, e-government is still facing the challenge of generating greater users' interaction in terms of accessing information, utilizing services and participating in e-government decision making. Evidence from relevant research indicates that users' acceptance and adoption of e-governments can be significantly influenced by whether e-governments have sufficiently demonstrated their usability and credibility. In other words, usability and credibility are therefore considered as two important factors in determining e-government success, which needs to be explored.

Given that the website is the interface for a specific e-government (whether national or local level), this can now be seen as the main channel for demonstrating usability and credibility. As such, this research has evaluated usability and credibility of current e-government websites. After an initial literature review and background study, the study has adopted heuristic evaluation, which is based on users' perception, to implement a thorough and in-depth assessment of e-government websites. In addition, to obtain a more comprehensive evaluation, users' performance has measured in order to reveal the level of users' interaction with e-government websites when they perform a set of practical tasks. The research design was a quasi-experimental, consisting of two linked experiments. Experiment 1 has evaluated the usability and credibility of the target e-government websites, identifying the existing usability and credibility problems. Experiment 2 has examined the effects of the proposed design solutions on the usability and credibility problems identified on the redesigned e-government websites. The research findings imply that usability and credibility have not been addressed at the detailed level of e-government website design. Moreover, it suggests that current e-government websites need to improve their usability and credibility. The improvements in usability and credibility may affect users' attitudes, which in turn, can lead to better interaction with e-governments. Therefore, usability and credibility are two important factors influencing users' interaction with e-government. In other words, it is important to ensure that usability and credibility of e-government meets the requirements of different users, so that users' engagement with e-government may be promoted. To achieve this goal, this research focuses on the users' perspective, which can help to understand the usability and credibility requirements of users, clearly identify existing usability and credibility problems that cause concern and effectively improve the identified usability and credibility problems. In this way, it can provide concrete prescriptions for developing more user-centred e-government that may meet different users' requirements and support users achieving the desired services outcome and so generate greater users' participation. Furthermore, this study has extended Nielsen's set of usability heuristics and Fogg's set of credibility guidelines, which can be useful for assessing e-government usability and credibility. Meanwhile, the study has developed a set of guidelines, containing a number of detailed design features in relation to usability and credibility for e-

government development, with the final target being to create more usable and credible e-government. The following sections present the detailed conclusions drawn from the research efforts.

9.3 Review of the research questions

There have been five research questions under investigation in this study. Table 9.1 lists these research questions and indicates the research stages used for approaching investigation. These research questions are then reviewed and discussed in the following sub-sections.

Table 9.1 Overview of research questions

Research questions	Research stages	Where answered
RQ1: What are the existing usability problems in current e-government websites?	To understand usability and credibility of e-governments	This was achieved in Chapter 2 by reviewing existing literature and relevant studies
RQ2: What are the existing credibility problems in current e-government websites?	To produce sets of usability heuristics and credibility guidelines to be used in evaluation	Nielsen's usability heuristics and Fogg's credibility guidelines were extended in Chapter 3 so they could fit with the particular needs of e-government, with three additional heuristics and three guidelines added respectively
	To identify specific usability and credibility criteria of e-governments for usability and credibility evaluation To identify the target e-government websites used in evaluation	A set of usability and credibility criteria were developed based on the extension of usability heuristics and credibility guidelines and three local e-government websites were selected for evaluation in Chapter 4
	To evaluate usability and credibility of the target e-government websites, identifying the usability and credibility problems	This was achieved in Chapter 5, where the target e-government websites were evaluated based on heuristic evaluation and performance measurement
RQ3: What are the effects of the proposed usability design solutions on the usability problems on each target e-government website?	To understand the usability and credibility problems found and provide the corresponding design solutions	The design solutions for the identified usability and credibility problems were proposed and designed into each target e-government website in Chapter 6
RQ4: What are the effects of the proposed credibility design solutions on the credibility problems on each target e-government website?	To examine the effects of the proposed design solutions on the usability and credibility problems on each redesigned e-government website To measure users' task performance with each redesigned e-government website	These were achieved in Chapter 7, where the proposed design solutions were assessed based on users' perception. In addition, users' task performance with the redesigned e-government websites were also measured

RQ5: What are the effects of the proposed design solutions on users' interaction with each target e-government website?	To develop a set of usability and credibility guidelines to guide usability and credibility in relation to e-government website design	Detailed usability and credibility guidelines were developed for designing more usable and credible e-government websites in Chapter 8
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9.3.1 Research question 1

In order to identify the existing usability problems in current e-government websites, this research applied heuristic evaluation, which is based on users' perception of the extension of Nielsen's usability heuristics to implement a thorough and in-depth assessment of current e-government websites. Data were collected through the closed and open-ended questions of the questionnaires (usability and credibility questionnaire for experiment 1). The findings indicated that a number of the usability problems have been identified in each target e-government website, and there is a need for current e-government websites to improve their usability.

More specifically, regarding London Authority 1, the usability problems found were: users are confused by links that have many different colours; online help function is not clearly indicated on the site; it is difficult to switch between online help and current work; overloaded information is presented on the site; the site has a weak search engine function.

Regarding London Authority 2, the usability problems detected included: some options on the home page are not clearly presented; users are confused by links that have many different colours; the site sometimes does not indicate a task's progress; links already used are not clearly marked; the site allows users to skip over the order of the process; excessive text is displayed on the site; the search engine capability is poor; the site lacks navigation tools.

Regarding London Authority 3, the usability problems identified were: users are confused by links that have many different colours; subject categories are presented in an illogical order; links already used are not clearly marked; information arrangement is unbalanced between breadth and depth; the site does not provide multi-language support.

9.3.2 Research question 2

In order to detect the credibility problems, heuristic evaluation is also conducted, which is based on users' perception of the extension of Fogg's credibility guidelines to assess credibility of the target e-government websites. Data was obtained through the closed and open-ended questions of the questionnaires (usability and credibility questionnaire for experiment 1). The findings found a number of the credibility problems in each target e-government website, which suggests that current e-governments have not paid enough attention to credibility in relation to their website design.

In detail, with respect to London Authority 1, the credibility problems found were: information is presented without consistent colours; the site lacks of images.

Regarding London Authority 2, the credibility problems identified were: search results are not organised by the level of relevance; content is displayed without consistent layout; there is no security message when users access some confidential information; there are too many categories options presented on some pages.

Regarding London Authority 3, the credibility problems detected included: detailed contact information has not been organised by different departments of the council; awards, it is difficult to see the site's credentials, the site does not provide a shortcut option to access information about the local council, there is no clear secure message when users access some confidential information; it is not clear to see how much users have completed and how much remains when completing tasks; the information about the site update is not clearly presented; it is difficult to see a log-in option when users conduct some personal services; the site does not provide service feedback for users.

9.3.3 Research question 3

In order to examine the effects of the proposed design solutions on the usability problems on each target e-government website, data was gathered by the closed and open-ended questions of the questionnaires (usability and credibility questionnaire for experiment 2). The results indicated that the proposed design solutions have improved the usability problems found in experiment 1 on each redesigned e-government website.

In detail, regarding the redesigned London Authority 1, users' perception of the usability problems (including links with many different colours, difficulty of finding the online help function, difficulty of switching between online help and current work) had been significantly alleviated after the proposed design solutions had been applied to the redesigned e-government website. In addition, users' feedback from the open-ended questions also revealed their positive attitude towards the improved usability features.

Regarding the redesigned London Authority 2, users' perception of the usability problems (including vague options presentation on the home page, links with many different colours, absence of task progress indication, difficult recognition of visited links, skipping over the order of the process) had been significantly improved in experiment 2. Moreover, users' positive feedback obtained from the open-ended questions of the questionnaire addressed the usefulness of the redesigned usability features.

Regarding the redesigned London Authority 3, users' perception of the usability problems (including links with many different colours, subject categories arrangement in an illogical order) had been also significantly alleviated after the proposed design solutions had been implemented in experiment 2. Furthermore, the results from open-ended questions also revealed users' positive feedback of the redesigned usability features. However, although no significant difference was found between experiments 1 and 2 with regards to the usability features that visited links are not clearly marked and users get lost due to being given too many choices over sequences, the results still

showed that the participants' assessments had been influenced after the design solutions had been applied to the redesigned London Authority 3.

9.3.4 Research question 4

In order to examine the effects of the proposed design solutions on the credibility problems on each target e-government website, data was collected through the closed and open-ended questions of the questionnaires in experiment 2 (usability and credibility questionnaire for experiment 2). The results indicated that there is a significant difference in users' perception of the specific credibility features between experiments 1 and 2. More specifically, regarding the redesigned London Authority 1, users' perception of the credibility problem (information presentation without colour consistency) was significantly alleviated after the proposed design solutions had been applied to experiment 2. Regarding the redesigned London Authority 2, users' perception of the credibility problems (including search results without level of relevance arrangement, information presentation without layout consistency, and no security message presentation) were also significantly improved. Regarding the redesigned London Authority 3, users' perception of the credibility problems (including illogical detailed contact information arrangement, lack of the site's credentials display, difficulty of finding the council information, absence of security messages display, absence of task progress indication, difficulty of identifying site update, absence of a sign-in option) were significantly alleviated after the proposed design solutions had been implemented in experiment 2. Additionally, the results from open-ended questions of the questionnaires also indicated users' positive feedback about the improved credibility features in three redesigned e-government websites. Therefore, it implies that the proposed design solutions improve the credibility problems found in each redesigned e-government website.

9.3.5 Research question 5

In order to find out the effects of the proposed design solutions on users' interaction with each redesigned e-government website, users' task performance with the

redesigned e-government websites was measured. The performance measurement applied the same performance criteria used in experiment 1, which includes the amount of online help required, time spent completing tasks, number of steps to finish tasks and number of successful tasks completion. Data was collected through observation. The findings revealed that users' interaction with each redesigned e-government website in experiment 2 significantly differ from their interaction with the target e-government websites in experiment 1.

Within each redesigned London Authority, the findings indicated that users' performance in terms of time spent completing all tasks, and number of steps used for all tasks completion in experiment 2 is better than their performance in experiment 1. In detail, the participants in experiment 2 took less time to complete the tasks than experiment 1. In addition, the participants took fewer steps to finish all tasks in experiment 2 than experiment 1. However, although a significant difference in users' performance in terms of the amount of online help required and number of successful tasks completion was not found between experiments 1 and 2, the results still showed that the participants in experiment 2 required less online help to complete all the tasks than those in experiment 1. Similarly, the participants in experiment 2 completed more tasks successfully than those in experiment 1. Therefore, this implies that users' interaction with each redesigned e-government website is enhanced after the proposed design solutions have been implemented in experiment 2.

9.4 Research contributions

This research has evaluated the usability and credibility of current e-government websites in the UK. The evaluation has found a number of usability and credibility problems in the target e-government websites. Based on the problems identified, the research has provided the proposed design solutions to improve usability and credibility. The results indicate that the proposed design solutions have improved the usability and credibility problems. These improvements may increase the overall usability and credibility of the target e-government websites, which can result in better users' interaction with the e-government websites. According to these research

findings, it demonstrates the importance of the usability and credibility to e-government. In addition, it raises the issues that usability and credibility have not been considered in sufficient detail to inform e-government websites design. Moreover, it also suggests that current e-government websites need to improve their usability and credibility. In this context, this research has developed a set of usability and credibility guidelines for developing more usable and credible e-government websites. Therefore, this study has made contributions in two areas of knowledge. They are knowledge about usability and credibility and knowledge about e-government website development.

9.4.1 Contribution to knowledge about usability and credibility

The contribution to knowledge about usability and credibility is indicated by the following four aspects. Firstly, this study has deepened understanding of usability and credibility concepts within an e-government context. Although the importance of usability to e-government has been suggested in existing literature (e.g. Baker, 2009; Henriksson et al., 2007; Kossak et al., 2001; Magoutas et al., 2010; Schedler and Summermatter, 2007), and credibility has been indicated in terms of government information (e.g. Tolbert and Mossberger, 2003; Welch and Hinnant, 2003) and government services provision (e.g. Bélanger and Carter, 2008; Horst et al., 2007; Warkentin et al., 2002), there is inconclusive evidence as to the usability and credibility investigation of e-government, especially with regards to e-government website design. This study has focused on specific aspects of usability and credibility relating to design features of e-government websites. Moreover, in order to meet the particular requirements of e-government, this study has extended the usability concept by adding extra factors: “interoperability”; “support and extend users’ skills”; “pleasurable and respectful interaction with users”, and expanded the credibility concept by deriving additional factors: “transparency”; “service agility”; and “privacy and security”. Such usability and credibility extension provides a deeper understanding about the usability and credibility in e-government environment.

Secondly, this study investigates e-government usability and credibility from the users' perspective, focusing on users' perception and performance. By focusing on

users' perception and performance, it can directly identify what e-government features can cause users to have most concerns about usability and credibility, and clearly indicate the level of users' interaction with the target e-governments. Such user involvement can provide better understanding of users' requirements of usability and credibility. More specifically, with better improvement of usability from the users' viewpoint, users are more satisfied by their interaction with e-government websites and can more easily and effectively accomplish what they want to do on the e-government websites. With better enhancement of credibility based on users' requirements, users are more sure that the e-government website is current and a legitimate site that they can trust, and can more confidently participate in e-government services.

Thirdly, this study provides empirical evidence that there is a close relationship between users' perception of usability and credibility and their performance. In other words, users' perception of usability and credibility positively influence users' performance when they perform a set of practical tasks on e-government websites. In existing literature, studies have revealed the influence of usability to users' perception and satisfaction (e.g. Hornbæk, 2006). Equally, other studies have examined the effect of credibility on users' attitude (e.g. Tormala et al., 2006). However, there is a lack of empirical evidence as to whether users' perception of usability and credibility influence their task performance. The results of this study have confirmed previous findings and have also shown that users' performance may not only be influenced by the overall perception of usability and credibility, but also affected by the particular perception of usability and credibility, such as how professional the site looks. Additionally, the results also imply that with increase usability and credibility of e-government websites, users' task performance is promoted. Thus, it strengthens the understanding that usability and credibility are crucial factors influencing users' performance.

Fourthly, this study has empirically indicated the relevant importance between usability and credibility. Usability and credibility are factors that are frequently considered in the literature on computer-based system studies. Some studies suggested that improving usability is very likely to enhance credibility (Fogg et al.,

2001). Some studies indicated that increased credibility can significantly strengthen usability (Nielsen, 2000). However, there is a lack of empirical evidence as to their relevant importance. This study has empirically provided evidence to indicate a close correlation between usability and credibility. The findings have revealed that better overall usability of the target e-government website is associated with better overall credibility, and vice versa. Equally, lowest overall usability of the target e-government website is associated with lowest overall credibility, and vice versa. Such findings suggest that usability and credibility have mutual influence, which needs to be considered together in e-government development.

9.4.2 Contribution to knowledge about e-government website development

Another important contribution of this study is to knowledge about e-government website development. This research has developed a set of usability and credibility guidelines, addressing the detailed design considerations from users' perspective. These guidelines can help designers to understand users and their usability and credibility needs. In particular, each guideline covers a number of the specific design features, which can provide designers with concrete usability and credibility guidance when they design e-government websites. Furthermore, these guidelines can also be used to support designers in evaluating whether or not a current e-government website is desirable based on whether the site design features meet these guidelines. In existing literature, some usability guidelines have been developed for interface design (e.g. Gerhardt-Powals, 1996; Henninger, 2000), and some credibility guidelines are available for general website development (e.g. Fogg and Tseng, 1999a). However, there are no specific guidelines to fit with the particular needs of e-government for designing or assessing its usability and credibility, especially for e-government website. As e-government shows rapid growth in the public sector, and usability and credibility have been increasingly recognised as the prominent factors in determining users' engagement with e-government, empirically based usability and credibility guidelines are vitally needed to support designers in designing, evaluating and improving e-government websites. In this aspect, a set of usability and credibility guidelines, addressing users' requirements provide designers with supportive

guidance to develop e-government websites. The final goal is to develop more usable and credible e-government that can meet users' needs and increase their participation.

Furthermore, this study has found a number of specific usability and credibility problems in existing e-government websites. More specifically, the usability problems identified are within the area of "aesthetic and minimalist design"; "help and documentation"; "recognition rather than recall"; "match between system and the real world"; "error prevention"; "flexibility and efficiency of use". Furthermore, the credibility problems are found to lie in the boundaries of "site looks professional"; "make site easy to use and useful"; "privacy and security"; "make it easy to contact"; "show the honest and trustworthy people behind the site"; "update site's content". The detailed usability and credibility problems identified in these areas can be directly used by designers to focus attention on specific features of e-government websites, and further enhance the usability and credibility of their existing e-governments.

9.5 Limitations of the research

There are some limitations of this research, which are discussed in this section. These limitations include effects of evaluation of knowledge, usability and credibility evaluation criteria identification, e-government website selection and the redesigned e-government websites.

The first limitation of the research is that the participants have different knowledge of evaluation and of e-government websites, which may influence their evaluation outcomes. Although the research provides the participants with a clear explanation of purpose, and the participants understand their specific tasks in the evaluation, the results indicated that the participants had different capabilities to assess usability and credibility. The participants who had a higher level of knowledge in terms of evaluation and subject domain led to more comprehensive evaluation results. Therefore, further research may provide participants with a short training in terms of specific knowledge of subject domain, which may improve evaluation outcomes.

The second limitation concerns the usability and credibility evaluation criteria identification. The process of selecting appropriate usability and credibility criteria and grouping them into the associated usability heuristics and credibility guidelines were based on the reviewed relevant studies. Some criteria might be found to relate to more than one heuristic or guideline, however the study grouped these criteria into one heuristic or guideline based on their key features.

The third limitation concerns the target e-government websites that were used to measure usability and credibility in this experimental study. This study has selected three e-government websites in the UK as the representative of e-government to investigate their usability and credibility. Although the results provide an insight into current e-government websites usability and credibility and give a good set of issues, this study, choosing three target e-government websites, is a starting point. Further work may be carried out with more distributed e-government websites to have a more comprehensive evaluation.

The fourth limitation relates to the redesigned e-government websites used in experiment 2. In order to examine the effects of the proposed design solutions on the usability and credibility problems identified from the target e-government websites, this research has redesigned the three target e-government websites according to the proposed design solutions. Each redesigned e-government website was designed on the basis of the corresponding target e-government website used in experiment 1, retaining the same structure, layout and content. The main purposes of the redesigned e-government websites were to provide rich information and services, support users' task performance and reflect the redesigned features. However, the redesigned e-government websites did not include all the website pages from the target e-government websites. This may affect users' general perception when users conduct a free-flow inspection of the redesigned e-government websites.

9.6 Future research

The findings of the research and the reflection on the study's limitations suggest some areas for future research. Firstly, future work may conduct further evaluations of e-governments located by administrative regions, such as England, Wales, Scotland and Northern Ireland. As the nature of these administrative regions are significantly different, especially in terms of government organisation structure, institution and information policies strategy, it is important to explore e-government development within these administrative regions. The results may indicate unique characteristics of e-government in the particular administrative regions, and such characteristics of e-governments can be also comparatively analysed. The findings may be helpful to increase understanding of e-government development across the UK and beneficial for governments in different regions to learn from each other in order to develop more effective e-governments.

Secondly, e-government has been applied worldwide. Future study may extend the usability and credibility inspection of e-government websites across different nations (allowing for social, political, cultural differences, etc.). The evaluation findings can indicate usability and credibility development of e-governments in a variety of nations, detecting their existing usability and credibility problems. These problems can be used to compare the identified problems in the UK, which may help researchers understand usability and credibility issues outside the UK. In addition, it can benefit researchers to understand e-government usability and credibility within cultural differences contexts.

Thirdly, a number of studies have revealed that individual differences, such as age, gender, and prior experiences, affect users' perception of websites (Fogg et al., 2001). Regarding e-government, Dwivedi and Williams (2008) also indicated that demographic characteristics, including age, gender and education backgrounds influence users' e-government adoption. This is also reflected in the study by Choudrie and Ghinea (2005), which showed that users' perception of usability of e-government websites has been affected by user age and education levels. It raises the importance of individual differences in users' perception of e-government. Therefore,

it would be useful to carry out future research to investigate what are the effects of individual differences on users' attitudes and perception towards usability and credibility in e-government websites. Such findings will be valuable to develop flexible e-government websites that can be accepted by and useful to a variety of individuals.

Fourthly, this research has developed a set of usability and credibility guidelines for improving usability and credibility of e-government websites. It is important to further measure the efficiency of these guidelines usage in practice. Accordingly, future studies may involve investigating the use of these usability and credibility guidelines in terms of designing or evaluating e-government websites. In addition, based on these guidelines, future studies may develop an evaluation framework for e-government, especially focused on the interaction of usability and credibility. The results can be helpful to achieve both a higher level of flexibility and reliability of these guidelines and better and more engaging e-government websites.

Fifthly, this study has investigated usability and credibility of e-governments from the users' perspective. Government organisations may have different opinions and considerations of usability and credibility when developing the e-governments. It is interesting to explore usability and credibility of e-governments from the government organisations' perspective. Therefore, future studies may carry out an investigation into usability and credibility, focusing on the government organisations' side. The findings can indicate the government viewpoint about usability and credibility. In addition, the results from both users' perspective and organisations' perspective can be comparatively analysed, which may be beneficial for obtaining a more comprehensive understanding of usability and credibility in order to develop more usable and credible e-governments.

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APPENDICES


Appendix 1a: Task sheet for London Authority 1 in experiment 1

Dear participants:

Many thanks for agreeing to take part in the experiment! During the experiment, you are required to carry out some tasks using an e-government website. I would be grateful if you could do the tasks below in the order shown:

1. Find the name of Chief Executive officer of Harrow council;
2. Find the title of any jobs related to social work in Harrow council, including their reference number and job description;
3. Find the telephone number of the Planning Department in Harrow council;
4. Find the Revenue Budget 2008-09 of Harrow council;
5. Use the search engine on this site to find the place to apply for “Free School Meals”;
6. Use “A to Z service” to find information about how to join the local library, fill in the adult library membership form and submit the form via the site; (using the user details provided)
7. Find the latest news about the reopening date of the Harrow Leisure centre;
8. Download the Primary School Guide 2009-10 to the computer (Drive C:\Form download);
9. Please sign-in the system firstly and fill in a “compliments, comments and complaints online form” to complain no street lamp on Kentmail Road and submit to Harrow council;

Enjoying completing these tasks!

Personal Details	
	Name: Jack Ben
	Employed: Research
	DOB: 15/09/1980
	Address: 2 St David Close Cowley


Appendix 1b: Task sheet for London Authority 2 in experiment 1

Dear participants:

Many thanks for agreeing to take part in the experiment! During the experiment, you are required to carry out some tasks using an e-government website. I would be grateful if you could do the tasks below in the order shown:

1. Find the name of Mayor of Hillingdon council;
2. Find the title of any jobs related to education& teaching in Hillingdon council, including their reference number and job description;
3. Find the telephone number of the Planning Reception in Hillingdon council;
4. Find the contact details of Brunel University in Hillingdon council;
5. Use the search engine on this site to find who is eligible for application of “Free School Meals”;
6. Find the latest news about the Animal friendly awards in Hillingdon council;
7. Download Council Budget Book 2008/09 to the computer (Drive C:\Form download);
8. Please fill in a “vehicle crossing online form” and submit to Hillingdon council; (using the user details provided)
9. Use “A to Z service” to find information about the library charges for language courses in Uxbridge Central library;

Enjoying completing these tasks!

Personal Details	
	Name: Jack Ben
	Employed: Research
	DOB: 15/09/1980
	Address: 2 St David Close Cowley Uxbridge


Appendix 1c: Task sheet for London Authority 3 in experiment 1

Dear participants:

Many thanks for agreeing to take part in the experiment! During the experiment, you are required to carry out some tasks using an e-government website. I would be grateful if you could do the tasks below in the order shown:

1. Find the name of Mayor of Hounslow council;
2. Find the latest jobs related to health care in Hounslow council, including their reference number and job description;
3. Find the contact details of the Cleansing Services in Hounslow council;
4. Find when the online admissions system for secondary school transfer 2009 available is in Hounslow council;
5. Use the search engine on this site to find who is eligible for application of “Free School Meals”;
6. Use “A to Z service” to find the application process for joining the children’s library services in Hounslow Council;
7. Find the latest news about the Heston House Open Day in Hounslow council;
8. Download the Street Drinking Report 2005 to the computer (Drive C:\Form download);
9. Please fill in a “general enquiry online form” to query how can I order a recycling bags and submit to Hounslow council; (using the user details provided)

Enjoying completing these tasks!

Personal Details	
	Name: Jack Ben
	Employed: Research
	DOB: 15/09/1980
	Address: 2 St David Close Cowley


Appendix 2a: Task sheet for the redesigned London Authority 1 in experiment 2

Dear participants:

Many thanks for agreeing to take part in the experiment! During the experiment, you are required to carry out some tasks using an e-government website. I would be grateful if you could do the tasks below in the order shown:

1. Find the telephone number of the Harrow Council (Adult social care);
2. Please use the online help option to find how to use this website, and then go back home page to find the general information about council tax in Harrow Council;
3. Find the latest news about Harrow crews fill 60 potholes a day;
4. Use “A-Z services” to find information about free school meals, fill in the free school meals application online form and submit it via the site (using the user details provided) ;
5. Find the information about school admissions in Harrow council;
6. Use the search engine on this site to find the information about library branches list in Harrow;
7. Please find the information about birth-registering in Harrow Council;
8. Please download “An economic profile of Harrow” to the computer (Drive C:\Documents download);
9. Please fill in a “compliments, comments and complaints online form” to complain no rubbish bins on church road and submit it to Harrow Council (using the user details provided);

Enjoying completing these tasks!

Personal Details	
	Name: Jack Ben
	Employed: Research
	DOB: 15/09/1980
	Address: 2 St David Close Cowley


Appendix 2b: Task sheet for the redesigned London Authority 2 in experiment 2

Dear participants:

Many thanks for agreeing to take part in the experiment! During the experiment, you are required to carry out some tasks using an e-government website. I would be grateful if you could do the tasks below in the order shown:

1. Please find the name of Mayor of Hillingdon Council;
2. Please find the information about rubbish, waste and recycling in Hillingdon Council;
3. Find the latest news about HillingdonFirst Supporting Businesses in Hillingdon Council;
4. Use the search engine on this site to find the information about the assistance with council tax;
5. Please fill in “online report form” regarding an abandoned vehicle on church road and submit it to Hillingdon Council;
6. Please use “A-Z services” to find the information about Uxbridge High School contact details;
7. Download council tax guide 2010-2011 to the computer (Drive C:\Documents download);
8. Find the title of any job related to build control in Hillingdon council, including their reference number and job description;
9. Find the information about your local libraries;

Enjoying completing these tasks!

Personal Details	
	Name: Jack Ben
	Employed: Research
	DOB: 15/09/1980
	Address: 2 St David Close Cowley


Appendix 2c: Task sheet for the redesigned London Authority 3 in experiment 2

Dear participants:

Many thanks for agreeing to take part in the experiment! During the experiment, you are required to carry out some tasks using an e-government website. I would be grateful if you could do the tasks below in the order shown:

1. Find the names of the councillors in Hounslow council;
2. Find the latest news about £1.5 millions for new local authority housing in Hounslow council;
3. Find the contact details of Hounslow council, especially their telephone number for different departments/services;
4. Use the search engine on this site to find how to join a local library in Hounslow;
5. Please find the introduction information about Hounslow council;
6. Use “A-Z services” to find the parking tickets information in Hounslow council;
7. Please sign in the system firstly, and fill in “an online enquiry form” to query how to get a student discount of council tax and submit this form to Hounslow council (using the user details provided);
8. Please download the document of council tax 2009/2010 to the computer (Drive C:\Documents download);
9. Find who is eligible for home care services in Hounslow council;

Enjoying completing these tasks!

Personal Details	
	Name: Jack Ben
	Employed: Research
	DOB: 15/09/1980
	Address: 2 St David Close Cowley

Appendix 3a: Pilot study 1

Pilot study 1

A pilot study is conducted in experiment 1 to assess whether the research instruments, measurements, produce and timing are properly designed and detect whether there are any mistakes during the experiment. According to the findings in the pilot study, some relevant changes are needed for experiment 1. Four PhD students at Brunel take part in the pilot study. They are randomly assigned to three different e-government sites (two in London Authority 1, one in London Authority 2 and one in London Authority 3). During the pilot study, the researcher acts as an observer to identify problems in the design, instruments and process of the experiment. The pilot study follows the experimental procedure which requires each participant to complete all the tasks assigned in an arranged order and fill out the usability and credibility questionnaires. Several changes are made for experiment 1 based on the observation results and the feedback from the participants' discussions. Table 1 summarises the instruments' problems identified from the pilot study and relevant changes for experiment 1.

In addition, there is some missing information that needs to be addressed to the participants in the experimental introduction. Therefore, the pilot study suggests extra detailed information which can support the participant to carry out their tasks during the experiment. These suggestions will be clearly presented in the information sheet. As shown in Table 2, some issues are suggested from the pilot study and changed in the information sheet for experiment 1.

Furthermore, data obtained in the pilot study is necessarily analysed in order to judge whether the expected results can be generated in the designed experiment. Therefore, data analysis in the pilot study briefly justifies that the research instruments are useful to identify some usability and credibility problems in order to answer the research questions. Table 3 below shows some relevant data to indicate that the research instruments employed in the pilot study can be used for the purpose of problems identification in experiment 1.

Table 1 Changes to the research instruments based on the pilot study 1

Research instruments	Issues description	Evidences	Proposed changes
Usability questionnaire	Spelling mistakes	UQ28(site 1,2,3): “search engineer”	UQ28(site 1,2,3): “search engine”
	Grammatical mistakes	UQ4,11,46(site1,2,3): “it is easily to do”	UQ4,11,46(site1,2,3): “it is easy to do” or “I can easily do”
	Vague statement	UQ 45(site 1,2,3): “easy to use the window operation” UQ48(site 1,2,3): “I like that every image is a harmonious member of a family of system”	UQ 45(site 1,2,3): “easy to operate the e-government site” UQ48(site1,2,3): “I like that every image is related to the topic of article in the system”
Credibility questionnaire	Vague statement	CQ 16(site 1,2,3): “it is clear to see the system’s credentials because the system displays awards it has owned” CQ21,37(site1,2,3): “my work”	CQ16(site1,2,3): “awards it has earned”
	Vague words	CQ 19(site 1,2,3): “contract”	CQ 21,37(site1,2,3): “my task” CQ 19(site1,2,3): “contact”
	Spelling mistakes		
Task sheet	Spelling mistakes	Task5 (site1,2,3): “search engineer”	Task5(site 1,2,3): “search engine”
	Task not cover the question	Task9(site 1): Did not cover CQ38 Task9(site 1): Did not mention the complaint subject	Task9(site 1): add sign-in sub task in the task 9 Task9(site 1): specify “no street lamp” as the complaint subject
	Lack of a subject	Task6,9(site 1,2,3): Need personal information	Task 6,9(site1,2,3) : A personal ID is offered on separate sheet
	Personal information need	Task5(site 3): “use search engine to fine the cost for adoption application of ‘Free School Meals’”	Task5(site 3): Delete “adoption”
	Vague task		

Table 2 Changes to the information sheet based on the pilot study

Information sheet	Issues description	Proposed changes
Time assigned section	Did not mention the time assigned before starting the tasks	Five minutes assigned to practise with e-government site
Observation section	Difficult to observe a task completion	The participants are required to show each task result to the observer Once the result is confirmed, the participants are required to go back home page to restart the next task
Questionnaire section	Did not mention whether e-government can be interacted with to support filling out the questionnaire	The participants are allowed to play with e-government during the questionnaire time

Table 3 Problems identification based on the pilot study

	Site 1 (London Authority 1)				Site 2 (London Authority 2)				Site 3 (London Authority 3)			
	Usability		Credibility		Usability		Credibility		Usability		Credibility	
Perception measure	14%		15%		18%		7%		6%		7%	
	Site 1				Site 2				Site 3			
Performance measure	T	N	H	C	T	N	H	C	T	N	H	C
	20m	38	1	88%	33m	72	0	88%	7m	37	0	88%

(T = time to complete all tasks; N = number of steps to finish all tasks; H = number of online help; C = correct tasks completed)

Appendix 3b: Pilot study 2

Pilot study 2

The second pilot study is used to assess whether the research instruments, measurements, experimental procedure and timing are appropriately designed in experiment 2. In addition, it attempts to look for whether there are any mistakes during the experiment. Therefore, this pilot study is conducted prior to the formal experiment 2 commencement. Three PhD students at Brunel University take part in the pilot study and are randomly allocated to three redesigned e-government websites (one participant for each redesigned e-government website). During the pilot study, the researcher acts as an observer to detect the potential problems in aspects of the design, instruments and process of experiment 2. The process of the pilot study follows the experimental procedure, which requires each participant to have three phases: free-flow inspection; task-based interaction and completing the questionnaire. Based on the findings from the observation and the feedback of the participants, some important changes are made for experiment 2. Table 1 summarises the problems identified in terms of the research instruments and experimental introduction from the pilot study, and the corresponding changes are also indicated.

Table 1 Changes to the research instruments based on the findings in the pilot study 2

Research instruments	Issues description	Evidences	Proposed changes
Questionnaire	Vague statement	UQ3 (site 2): "I can clearly see the task process because the system's progress has been indicated"	UQ3 (site 2): "I can clearly see my task progress because a progress indicator has been presented"
Task sheet	Personal information need	Task 4 (site 1): need extra personal information about user' kid	Task 4 (site 1): kid's name and school information are provided on personal ID
	Vague task	Task 2 (site 1): "please check the online help option, and then find the general information about council tax in Harrow Council"	Task 2 (site 1): "please use the online help option to find how to use this website, and then go back home page to find the general information about council tax in Harrow Council"
		Task 3 (site 2): "find the latest news about Hillingdon First in Hillingdon Council"	Task 3 (site 2): "find the latest news about Hillingdon First supporting business in Hillingdon Council"
		Task 7 (site 3): "a general enquiry online form"	Task 7 (site 3): "an online enquiry form"
	Overloaded subjects	Task 2 (site 2) "please find the	Task 2 (site 2) "please find the

		information about rubbish, waste and recycling in Hillingdon Council”	information about rubbish and recycling in Hillingdon Council”
Redesigned e-government websites	Broke links	Site 1: link of A-Z services-contact point is not working	Site 1: check and change link address
		Site 1: link of school and college goes to irrelevant page	Site 1: change the link to the right link location
		Site 1: no link between library page and library branches page	Site 1: set up the link between library page and library branches page
		Site 2: link of hillingdon first supporting business is broken	Site 2: change to the correct link address
	Missing links	Site 2: link of council tax is not working	Site 2: change the link to the right link address
		Site 1: missing link of “complaints and feedback option” in have your say page	Site 1: set up a link of “complaints and feedback option” to the relevant page
	Images missing	Site 2: missing links of rubbish and recycling in category R	Site 2: set up the links of rubbish and recycling in category R
		Site 3: an image is not presented on the page of community and living	Site 3: link to the right images location

In addition, there is some missing information that needs to be addressed in the information sheet. Therefore, the pilot study suggests extra brief information that can improve the participants understanding regarding the relation between this experiment and the previous experimental study that they took part in. These suggestions will be clearly presented at the beginning of the information sheet. Table 2 indicates these suggestions from the pilot study and relevant changes for experiment 2.

Table 2 Changes to the information sheet based on the pilot study

Information sheet	Issues description	Proposed changes
Introduction section	Did not mention the relation between this experiment (experiment 2) and the previous one (experiment 1) that the participants have attended.	To indicate that “This experiment (experiment 2) is based on the results obtained from the previous experimental study (experiment 1).” It is followed by the introduction of the purposes of experiment 1 and 2.

In addition, data obtained in the pilot study is analysed in order to indicate that the results can meet the requirements in the experimental design. Therefore, data analysis in the pilot study briefly justifies that the research design, instruments, and the procedure of experiment are useful to examine the proposed design solutions in order to answer the research questions. Table 3 shows some relevant data in terms of user perception and performance to indicate that the research instruments used in the pilot

study can be used for examining the effects of proposed design solutions in experiment 2.

Table 3 Results obtained from the pilot study

	Site 1 (redesigned London Authority 1)				Site 2 (redesigned London Authority 2)				Site 3 (redesigned London Authority 3)			
	Usability problems		Credibility problems		Usability problems		Credibility problems		Usability problems		Credibility problems	
Perception measure	Improved		Improved		Improved		Improved		Improved		Improved	
	Site 1				Site 2				Site 3			
Performance measure	T	N	H	C	T	N	H	C	T	N	H	C
	12.08m	34	0	100%	7.05m	25	0	100%	12.45m	32	0	100%

(T = time to complete all tasks; N = number of steps to finish all tasks; H = number of online help; C = correct tasks completed)

Appendix 4a: Usability and credibility questionnaire for London Authority 1 in experiment 1

Usability and credibility questionnaire

The purpose of this questionnaire is to assess the users' perception of usability and credibility of e-government. The information you give will be entirely confidential and will not be shared with any people not directly connected with this project. Please answer honestly and as accurately as you can. Your contribution is much appreciated.

Many thanks
Zhao Huang

Please choose the one most appropriate response to each statement

Personal information

Please select your gender: Male Female

Please select your age range: 20-25 25-30 30-35 35-45 50+

On average, how many hours a week do you spend on the Internet? 0-5 6-10 11-15 16-20 21+

Usability evaluation

Visibility of system status	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
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1. A title with every page clearly indicates the subject of the content.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------------------------------------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

2. It is easy to know the option in subcategories because the labels used are helpful to identify the option.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
---------------------------------------------------------------------------------------------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

3. It is easy to distinguish information because different parts of the screen present different sorts of information.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
------------------------------------------------------------------------------------------------------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

4. It is clear to see where I have been because the navigational path has been indicated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
-------------------------------------------------------------------------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

5. It is clear to see related information in a subject area because interdependent options appear on the same screen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
-----------------------------------------------------------------------------------------------------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Match between system and the real world	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
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6. I can clearly see the site's response time delay because the site's progress has been indicated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
-----------------------------------------------------------------------------------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

7. I like that the selected colours correspond to my expectations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------------------------------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

8. It is clear to how to proceed an action because there are prompts.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. It is difficult to know which links/subjects corresponded to the information I wanted.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
User control and freedom	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
10. I like that it allowed me to find the information in any order.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. I can easily review the previous information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. It is easy to find the relevant information for a specific task in the “A to Z of services”.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. I sometimes get lost due to being given too many choices over sequences.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Consistency and Standards	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
14. I like that the colours are similarly arranged on the each page of the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. It is easy to see the content of subcategories on the each page because a different size of font is always applied.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. It is easy to choose the option in subcategories because the sub options are always presented in alphabetical order.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. I like that online-help can always be shown on each page whenever needed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. I like that each page always follows the same display format.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Error prevention	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
19. It is difficult to make errors in an action because the site does not allow me to skip over the order of the process.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. It is easy to see errors because the site indicates a highlighted message around errors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. It is easy to fill in the right data in a data entry field because the number of character spaces available in a field has been indicated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. I can clearly see the progress in an action because the steps completed in the whole process have been indicated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Recognition rather than recall	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
23. It is easy to know the key					

information/subject sought because it is placed in a central location on the page.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. It is confused at the home page because some options are not clear.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. It is easy to read text because “breathing space” has been appropriately used in text areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flexibility and efficiency of use	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
26. The options/links used are all working properly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. It is difficult to choose the option in the subcategories because no detailed information is provided for these options.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. It is difficult to see the most relevant result using the search engine because arrangement of results is not in level of relevance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. It is easy to find detailed information because the menu presents options in an hierarchical way.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aesthetic and minimalist design	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
30. Each image corresponds to each context because it is relevant to the subject.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Each page is uncluttered in content presentation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. It clearly indicates which choices/links are already used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. I am confused with links that have different colours.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. It can lead my eyes in the appropriate direction because white space is used to create symmetry.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Help users recognize, diagnose, and recover from errors	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
35. It is easy to correct the errors when filling out forms because the system indicates what is causing the error.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. It is easy to understand the errors because the site interprets what causes the errors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. It is clear to distinguish a compulsory or optional field because a marker has been indicated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. It is quick to change the particular	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

data in a previous section so I do not need to retype all the data when I go back.

Help and documentation	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
39. Online-help is useful because I can find the relevant answer to solve the problem.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. It is easy to find help functions in the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. It is easy to switch between online-help and my current work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Interoperability	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
42. I can complete the task required because the abbreviations, acronyms, codes are understandable in the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. I like that the hierarchy of the site structure fits my progressive level of the tasks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. I like that the different displays on each page are compatible through the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Skills	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
45. It is easy to operate the e-government site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46. I can use sites' functions to easily complete most tasks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47. It is easy to move forward and backward within different fields of the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pleasurable and respectful interaction with user	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
48. I like that every image is related to the topic of article in the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49. I like that no excessive text is in each page.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
50. I like that the accessibility setting is always available whenever I needed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
51. Please list five difficulties when using this e-government site					

52. Please list five usability strengths of this e-government site

53. Please list five usability weaknesses of this e-government site

Credibility evaluation					
System looks professional	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
1. The content of the site matches with information you expect to obtain from a local council.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. I can easily find relevant information because information is presented with consistent colours.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. It is easy to read information in the site because the content is organised by subject categories.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. It is easy to see relationships between the pages because each page is labelled.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Easy to verify the information accuracy	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
5. I like that the information on each page is at the right level of details.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. It is easy to locate a relevant subcategory because the subcategories are arranged in an alphabetical order.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Information presented in a page matches with the name of the categories.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. The URL properly presents the domain name of the local council, e.g. ending with "gov.uk"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Show a real organization behind site	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
9. It is easy to find a postal address of the local	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

council offices in the site.

10. I like that the site displays photos of offices or staff members.

11. It is easy to see the site's accreditations because the site links with other governmental bodies.

Highlight the expertise in your organization and in the content and services provided **Strongly agree** **Agree** **Neutral** **Disagree** **Strongly Disagree**

12. It is clear to understand the policies and services offered by the site because detailed information is provided.

13. Information presented in the site can make you believe in the reliability of the local council.

14. Prompts /messages displayed are concise to help you complete the tasks.

Show that honest, trustworthy people stand your site **Strongly agree** **Agree** **Neutral** **Disagree** **Strongly Disagree**

15. It is easy to see the information about the local council because the site provides an "About use" option.

16. It is clear to see the site's credentials because the site displays awards it has earned.

17. It is easy to find information about people who are working or in charge of the local council.

Make it easy to contact you **Strongly agree** **Agree** **Neutral** **Disagree** **Strongly Disagree**

18. It is easy to find contact information because the "Contact" option has been clearly indicated.

19. I like that different contact methods are provided.

20. It is easy to find the detailed levels of the contact information because the contact information has been organised by different departments.

Make site ease to use and useful **Strongly agree** **Agree** **Neutral** **Disagree** **Strongly Disagree**

21. I can quickly start my task because the site is easy to use.

22. There is a clear description to help me identify where I am in the site.

23. It is clear to indicate how much I have done and how much was left when I complete the tasks.

24. It is easy to choose a suitable option from search results because the option is organised by the level of relevance.

Update site's content often	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
25. It is clear to identify how current the information presented in the site is, because the updated date is presented.	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
User restraint with any promotional content	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
26. I like that the site does not present too many irrelevant promotion contents.	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
27. It is easy to distinguish advertisement from the content.	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
Avoid errors of all type	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
28. It is easy to fill out a form because proper instruction is given.	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
29. Each link presented in the site can properly connect to the relevant page.	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
30. It is easy to read the content in the site because the site has no typographical error.	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
Transparency	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
31. I like that the site provides information about the budgetary execution of the local council.	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
32. I like that the site provides information about the site terms and conditions.	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
33. There is a message to help you identify whether the transaction is completed in the end of the process.	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
34. It is clear to see my status in an action because the progress has been indicated.	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
Service agility	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
35. I like that the site allows me to work at my own pace.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. It is easy to identify relationships among categories because information is organised in a hierarchical way.	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
37. It is convenient to start my task because many different approaches can be used in the site.	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
Privacy	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
38. I like that some personal services are protected with a password.	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
39. A secure message is presented when you are not allowed to access some confidential information.	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
40. Please list five credibility strengths of this e-government site					

41. Please list five credibility weaknesses of this e-government site

Appendix 4b: Usability and credibility questionnaire for London Authority 2 in experiment 1

Usability and credibility questionnaire

The purpose of this questionnaire is to assess the users' perception of usability and credibility of e-government. The information you give will be entirely confidential and will not be shared with any people not directly connected with this project. Please answer honestly and as accurately as you can. Your contribution is much appreciated.

Many thanks
Zhao Huang

Please choose the one most appropriate response to each statement

Personal information

Please select your gender: Male Female

Please select your age range: 20-25 25-30 30-35 35-45 50+

On average, how many hours a week do you spend on the Internet? 0-5 6-10 11-15 16-20 21+

Usability evaluation

Visibility of system status	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. A title with every page clearly indicates the subject of the content.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. It is easy to know the option in subcategories because the graphics used are helpful to identify the option.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. It is easy to distinguish information because different parts of the screen present different sorts of information.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. It is difficult to see where I have been because the navigational path has not been clearly indicated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. It is clear to see related information in a subject area because interdependent options appear on the same screen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Match between system and the real world	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
6. I can clearly see the site's response time delay because the site's progress has been indicated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I like that the selected colours correspond to my expectations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. It is clear to how to proceed an action because there are prompts.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. It is difficult to know which links/subjects corresponded to the information I wanted.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
User control and freedom	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
10. I like that it allowed me to find the information in any order.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. I can easily review the previous information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. It is easy to find the relevant information for a specific task in the “A to Z of services”.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. I sometimes get lost due to being given too many choices over sequences.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Consistency and Standards	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
14. I like the fact that the colours are similarly arranged on the each page of the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. It is easy to see the content of subcategories on the each page because a different size of font is always applied.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. It is easy to choose the option in subcategories because the sub options are always presented in alphabetical order.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. I like that online-help can always be shown on each page whenever needed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. I like that each page always follows the same display format.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Error prevention	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
19. It is easy to make errors in an action because the site allows me to skip over the order of the process.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. It is easy to see errors because the site indicates a highlighted message around errors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. It is easy to fill in the right data in a data entry field because the number of character spaces available in a field has been indicated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. I can clearly see the progress in an action because the steps completed in the whole process have been indicated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Recognition rather than recall	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
23. It is easy to know the key information/subject sought because it is placed in a central location of the page.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

24. It is confused at the home page because some options are not clear.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. It is easy to read text because “breathing space” has been appropriately used in text areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flexibility and efficiency of use	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
26. The options/links used are all working properly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. It is easy to choose the option in the subcategories because the brief information is provided for these options.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. It is difficult to see the most relevant result using the search engine because arrangement of results is not in level of relevance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. It is easy to find detailed information because the menu presents options in a hierarchical way.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aesthetic and minimalist design	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
30. Each image corresponds to each context because it is relevant to the subject.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Each page is uncluttered in content presentation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. It clearly indicates which choices/links are already used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. I am confused with links that have different colours.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. It can lead my eyes in the appropriate direction because white space is used to create symmetry.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Help users recognize, diagnose, and recover from errors	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
35. It is easy to correct the errors when filling out forms because the system indicates what is causing the error.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. It is easy to understand the errors because the site interprets what causes the errors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. It is clear to distinguish a compulsory or optional field because a marker has been indicated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. It is quick to change the particular data in a previous section so I do not need to retype all the data when I go back.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Help and documentation	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
39. Online-help are useful because I can find the relevant answer to solve the problem.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

40. It is easy to find help functions in the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. It is easy to switch between online-help and my current work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Interoperability	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
42. I can complete the task required because the abbreviations, acronyms, codes are understandable in the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. I like that the hierarchy of the site structure fits my progressive level of the tasks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. I like that the different displays on each page are compatible through the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Skills	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
45. It is easy to operate the e-government site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46. I can use sites' functions to easily complete most tasks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47. It is easy to move forward and backward within different fields of the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pleasurable and respectful interaction with user	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
48. I like that every image is related to the topic of article in the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49. I like that no excessive text is in each page.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
50. I like that the accessibility setting is always available whenever I needed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

51. Please list five difficulties when using this e-government site

52. Please list five usability strengths of this e-government site

53. Please list five usability weaknesses of this e-government site

Credibility evaluation					
System looks professional	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
1. The content of the site matches with information you expect to obtain from a local council.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. I can easily find relevant information because content is presented with consistent layout.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. It is easy to read information in the site because the content is organised by subject categories.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. It is easy to see relationships between the pages because each page is labelled.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Easy to verify the information accuracy	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
5. I like that the information on each page is at the right level of details.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. It is easy to locate a relevant subcategory because the subcategories are arranged in an alphabetical order.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Information presented in a page matches with the name of the categories.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. The URL properly presents the domain name of the local council, e.g. ending with "gov.uk"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Show a real organization behind site	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
9. It is easy to find a postal address of the local council offices in the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. I like that the site displays photos of offices or staff members.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. It is easy to see the site's accreditations because the site links with other governmental bodies.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Highlight the expertise in your organization and in the content and services provided	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
12. It is clear to understand the policies and services offered by the site because detailed information is provided.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Information presented in the site can make you believe in the reliability of the local council.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Prompts /messages displayed are concise to help you complete the tasks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Show that honest, trustworthy people stand your site	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
15. It is difficult to see the information about the local council because the site does not provide a shortcut option.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. It is difficult to see the site's credentials because the site does not display awards it has earned.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. It is easy to find information about people who are working or in charge of the local council.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Make it easy to contact you	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
18. It is easy to find contact information because the "Contact" option has been clearly indicated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. I like that different contact methods are provided.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. It is hard to find the detailed levels of the contact information because the contact information has not been organised by different departments.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Make site ease to use and useful	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
21. I can quickly start my task because the site is easy to use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. There is not a clear description to help me identify where I am in the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. It is clear to indicate how much I have done and how much was left when I complete the tasks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. It is easy to choose a suitable option from search results because the option is organised by the level of relevance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Update site's content often	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
25. It is clear to identify how current the information presented in the site is, because the	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

updated date is presented.

User restraint with any promotional content	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
26. I like that the site does not present too many irrelevant promotion contents.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. It is easy to distinguish advertisement from the content.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Avoid errors of all type	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
28. It is easy to fill out a form because proper instruction is given.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Each link presented in the site can properly connect to the relevant page.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. It is easy to read the content in the site because the site has no typographical error.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transparency	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
31. I like that the site provides information about the budgetary execution of the local council.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. I like that the site provides information about the site terms and conditions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. There is a message to help you identify whether the transaction is completed in the end of the process.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. It is clear to see my status in an action because the progress has been indicated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Service agility	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
35. I like that the site allows me to work at my own pace.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. It is easy to identify relationships among categories because information is organised in a hierarchical way.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. It is convenient to start my task because many different approaches can be used in the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Privacy	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
38. It is hard to see a sign-in option when I do some personal services.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. A secure message is presented when you are not allowed to access some confidential information.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Please list five credibility strengths of this e-government site					

41. Please list five credibility weaknesses of this e-government site

Appendix 4c: Usability and credibility questionnaire for London Authority 3 in experiment 1

Usability and credibility questionnaire

The purpose of this questionnaire is to assess the users' perception of usability and credibility of e-government. The information you give will be entirely confidential and will not be shared with any people not directly connected with this project. Please answer honestly and as accurately as you can. Your contribution is much appreciated.

Many thanks
Zhao Huang

Please choose the one most appropriate response to each statement

Personal information

Please select your gender: Male Female

Please select your age range: 20-25 25-30 30-35 35-45 50+

On average, how many hours a week do you spend on the Internet? 0-5 6-10 11-15 16-20 21+

Usability evaluation

Visibility of system status	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
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1. A title with every page clearly indicates the subject of the content.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------------------------------------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

2. It is difficult to know the option in subcategories because only text is used to identify the option.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
----------------------------------------------------------------------------------------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

3. It is easy to distinguish information because different parts of the screen present different sorts of information.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
------------------------------------------------------------------------------------------------------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

4. It is clear to see where I have been because the navigational path has been indicated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
-------------------------------------------------------------------------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

5. It is clear to see related information in a subject area because interdependent options appear on the same screen.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
-----------------------------------------------------------------------------------------------------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Match between system and the real world	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
-----------------------------------------	-----------------------	--------------	----------------	-----------------	--------------------------

6. I can clearly see the site's response time delay because the site's progress has been indicated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
-----------------------------------------------------------------------------------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

7. I like that the selected colours correspond to my expectations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------------------------------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

8. It is not clear to how to proceed an action because there is no prompt.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. It is difficult to know which links/subjects corresponded to the information I wanted.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
User control and freedom	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
10. I like that it allowed me to find the information in any order.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. I can easily review the previous information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. It is easy to find the relevant information for a specific task in the “A to Z of services”.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. I sometimes get lost due to being given too many choices over sequences.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Consistency and Standards	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
14. I like that the colours are similarly arranged on the each page of the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. It is easy to see the content of subcategories on the each page because a different colour of subtitle is always indicated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. It is difficult to choose the option in subcategories because no fix order of sub options is used in subcategories.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. I like that online-help can always be shown on each page whenever needed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. I like the fact that each page is always followed the same display format.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Error prevention	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
19. It is difficult to make errors in an action because the site does not allow me to skip over the order of the process.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. It is easy to see errors because the site indicates a highlighted message around errors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. It is easy to fill in the right data in a data entry field because the number of character spaces available in a field has been indicated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. It is difficult to see the progress in an action because the site does not indicate the steps completed in the whole process.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Recognition rather than recall	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
23. It is easy to know the key information/subject sought because it is placed in a central location of the page.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

24. It is confused at the home page because some options are not clear.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. It is easy to read text because “breathing space” has been appropriately used in text areas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flexibility and efficiency of use	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
26. The options/links used are all working properly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. It is easy to choose the option in the subcategories because the brief information is provided for these options.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. It is easy to see the most relevant result using the search engine because arrangement of results is in level of relevance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. It is easy to find detailed information because the menu presents options in a hierarchical way.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aesthetic and minimalist design	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
30. Each image corresponds to each context because it is relevant to the subject.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Each page is uncluttered in content presentation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. It clearly indicates which choices/links are already used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. I am confused with links that have different colours.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. It can lead my eyes in the appropriate direction because white space is used to create symmetry.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Help users recognize, diagnose, and recover from errors	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
35. It is easy to correct the errors when filling out forms because the site indicates what is causing the error.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. It is easy to understand the errors because the site interprets what causes the errors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. It is clear to distinguish a compulsory or optional field because a marker has been indicated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. It is quick to change the particular data in a previous section so I do not need to retype all the data when I go back.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Help and documentation	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
39. Online-help is useful because I can find the relevant answer to solve the problem.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

40. It is easy to find help functions in the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. It is easy to switch between online-help and my current work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Interoperability	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
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42. I can complete the task required because the abbreviations, acronyms, codes are understandable in the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

43. I like that the hierarchy of the site structure fits my progressive level of the tasks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

44. I like that the different displays on each page are compatible through the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Skills	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
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45. It is easy to operate the e-government site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

46. I can use sites' functions to easily complete most tasks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

47. It is easy to move forward and backward within different fields of the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Pleasurable and respectful interaction with user	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
---------------------------------------------------------	-----------------------	--------------	----------------	-----------------	--------------------------

48. I like that every image is related to the topic of article in the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

49. I like that no excessive text is in each page.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

50. I like that the accessibility setting is always available whenever I needed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

51. Please list five difficulties when using this e-government site

52. Please list five usability strengths of this e-government site

53. Please list five usability weaknesses of this e-government site

Credibility evaluation					
System looks professional	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
1. The content of the site matches with information you expect to obtain from a local council.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. I can easily find relevant information because information is presented with consistent colours.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. It is easy to read information in the site because the content is organised by subject categories.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. It is easy to see relationships between the pages because each page is labelled.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Easy to verify the information accuracy	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
5. I like that the information on each page is at the right level of details.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. It is difficult to locate a relevant subcategory because no fixed order of the subcategory is arranged.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Information presented in a page matches with the name of the categories.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. The URL properly presents the domain name of the local council, e.g. ending with "gov.uk"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Show a real organization behind site	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
9. It is easy to find a postal address of the local council offices in the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. I like that the site displays photos of offices or staff members.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. It is easy to see the site's accreditations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

because the site links with other governmental bodies.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Highlight the expertise in your organization and in the content and services provided	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
12. It is clear to understand the policies and services offered by the site because detailed information is provided.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Information presented in the site can make you believe in the reliability of the local council.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Prompts /messages displayed are concise to help you complete the tasks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Show that honest, trustworthy people stand your site	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
15. It is difficult to see the information about the local council because the site does not provide a shortcut option.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. It is clear to see the site's credentials because the site displays awards it has earned.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. It is easy to find information about people who are working or in charge of the local council.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Make it easy to contact you	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
18. It is easy to find contact information because the "Contact" option has been clearly indicated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. I like that the different contact methods are provided.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. It is hard to find the detailed levels of the contact information because the contact information has not been organised by different departments.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Make site ease to use and useful	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
21. I can quickly start my task because the site is easy to use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. There is a clear description to help me identify where I am in the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. It is not clear to indicate how much I have done and how much was left when I complete the tasks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. It is easy to choose a suitable option from search results because the option is organised by the level of relevance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Update site's content often	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
25. It is clear to identify how current the information presented in the site is, because the updated date is presented.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
User restraint with any promotional content	Strongly	Agree	Neutral	Disagree	Strongly

	agree				Disagree
26. I like that the site does not present too many irrelevant promotion contents.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. It is easy to distinguish advertisement from the content.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Avoid errors of all type	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
28. It is easy to fill out a form because proper instruction is given.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Each link presented in the site can properly connect to the relevant page.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. It is easy to read the content in the site because the site has no typographical error.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transparency	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
31. I like that the site provides information about the budgetary execution of the local council.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. I like that the site provides information about the site terms and conditions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. There is a message to help you identify whether the transaction is completed in the end of the process.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. It is not clear to see my status in an action because the progress has not been indicated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Service agility	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
35. I like that the site allows me to work at my own pace.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. It is easy to identify relationships among categories because information is organised in a hierarchical way.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. It is convenient to start my task because many different approaches can be used in the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Privacy	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
38. It is hard to see a sign-in option when I do some personal services.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. A secure message is presented when you are not allowed to access some confidential information.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Please list five credibility strengths of this e-government site	<hr/> <hr/> <hr/>				

41. Please list five credibility weaknesses of this e-government site

Appendix 5a: Usability and credibility questionnaire for the redesigned London Authority 1 in experiment 2

Usability and credibility questionnaire

The purpose of this questionnaire is to assess the users' perception of the proposed design implication of usability and credibility on an e-government website. The information you give will be entirely confidential and will not be shared with any people not directly connected with this project. Please answer honestly and as accurately as you can. Your contribution is much appreciated.

Many thanks
Zhao Huang

Please choose the one most appropriate response to each statement

Personal information	
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- Please select your gender: Male Female
- Please select your age range: 20-25 25-30 30-35 35-45 50+
- On average, how many hours a week do you spend on the Internet? 0-5 6-10 11-15 16-20 21+

Usability features evaluation					
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	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. It is easy to find help functions in the system.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. I am confused with links that have different colours.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. It is easy to switch between online-help and my current work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Please provide some comments regarding the usability features indicated above					

Credibility features evaluation					
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	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. I can easily find relevant information					

because different colours are used consistently to present different kinds of information.

2. Please provide some comments regarding the credibility feature indicated above

Appendix 5b: Usability and credibility questionnaire for the redesigned London Authority 2 in experiment 2

Usability and credibility questionnaire

The purpose of this questionnaire is to assess the users' perception of the proposed design implication of usability and credibility on an e-government website. The information you give will be entirely confidential and will not be shared with any people not directly connected with this project. Please answer honestly and as accurately as you can. Your contribution is much appreciated.

Many thanks
Zhao Huang

Please choose the one most appropriate response to each statement

Personal information					
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- Please select your gender: Male Female
- Please select your age range: 20-25 25-30 30-35 35-45 50+
- On average, how many hours a week do you spend on the Internet? 0-5 6-10 11-15 16-20 21+

Usability features evaluation					
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	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. I am confused with links that have different colours.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. It is confused at the home page because I do not know where I can start.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I can clearly see my task progress because a progress indicator has been presented.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. It clearly indicates which choices/links are already used because italic has been applied.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. It is easy to make errors in an action because the system allows me to skip over the order of the process.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Please provide some comments regarding the usability features indicated above

Credibility features evaluation					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. I can easily find relevant information because different colours are used consistently to present different kinds of information.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. It is easy to choose a suitable option because the option is organised by the level of relevance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. A security message is presented when you are allowed to access some confidential information.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. Please provide some comments regarding the credibility features indicated above

Appendix 5c: Usability and credibility questionnaire for the redesigned London Authority 3 in experiment 2

Usability and credibility questionnaire

The purpose of this questionnaire is to assess the users' perception of the proposed design implication of usability and credibility on an e-government website. The information you give will be entirely confidential and will not be shared with any people not directly connected with this project. Please answer honestly and as accurately as you can. Your contribution is much appreciated.

Many thanks
Zhao Huang

Please choose the one most appropriate response to each statement

Personal information

- Please select your gender: Male Female
- Please select your age range: 20-25 25-30 30-35 35-45 50+
- On average, how many hours a week do you spend on the Internet? 0-5 6-10 11-15 16-20 21+

Usability features evaluation

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. I am confused with links that have different colours.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. It clearly indicates which choices/links are already used because italic has been applied.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. It is difficult to know which links/subjects corresponded to the information I wanted.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. It is difficult to choose the option in subcategories because no fix order of sub options is used in subcategories.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. I sometimes get lost due to being given too many choices over sequences.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Please provide some comments regarding the usability features indicated above

Credibility features evaluation					
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. A security message is presented when you are allowed to access some confidential information.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. It is hard to find the detailed levels of the contact information because the contact information has not been organised by different departments.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. It is clear to see the system's credentials because the system displays awards it has earned.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. It is difficult to see the information about the local council because the system does not provide a shortcut option.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. It is not clear to indicate how much I have done and how much was left when I complete the tasks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. It is clear to identify how current the information presented in the system is, because the updated date is presented.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. It is hard to see a sign-in option when I do some personal services.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. Please provide some comments regarding the credibility features indicated above

Appendix 6: Consent form

MODEL CONSENT FORM

Please note that more information about obtaining consent can be found in the **General Ethical Guidelines and Procedures** which is available on the university website of the Research Ethic Committee

(<http://intranet.brunel.ac.uk/registry/minutes/researchethics/home.shtml>)

Please tick appropriate box

The participant should complete the whole of this sheet him/herself

	YES	NO
Have you read the Research Participant Information Sheet?	<input type="checkbox"/>	<input type="checkbox"/>
Have you had an opportunity to ask questions and discuss this study?	<input type="checkbox"/>	<input type="checkbox"/>
Have you received satisfactory answers to all your questions?	<input type="checkbox"/>	<input type="checkbox"/>
Who have you spoken to?.....		
Do you understand that you will not be referred to by name	<input type="checkbox"/>	<input type="checkbox"/>
Do you understand that you are free to withdraw from the study:		
- at any time	<input type="checkbox"/>	<input type="checkbox"/>
- without having to give a reason for withdrawing?	<input type="checkbox"/>	<input type="checkbox"/>
Do you agree to take part in this study?	<input type="checkbox"/>	<input type="checkbox"/>

Signature of Research Participant.....

Date.....

Name in capitals.....

Appendix 7a: Information sheet for experiment 1



Information sheet

Dear participants:

Many thanks for agreeing to take part in the experiment! My name is Zhao Huang (Zhao.huang@brunel.ac.uk), a second year PhD student in the Information System and Computing Department, Brunel University. This project is conducted under the supervision of Dr. Laurence Brooks, Dr. Sherry Chen and Dr. George Ghinea (Dr. Laurence Brooks: Laurence.brooks@brunel.ac.uk; Dr. Sherry Chen: Dr. Sherry.chen@brunel.ac.uk; Dr. George Ghinea: George.ghinea@brunel.ac.uk). The purpose of this experiment is to assess the usability and credibility of e-government from the users' perspective.

At the beginning of the experiment, you will be given five minutes to look through an e-government website. Subsequently, you are required to do some tasks using the e-government website. It would be grateful if you could do the tasks in order. Once you finish one task, please show your task result to the observer. When you are ready for the next task, please go to e-government home page to start again. If any tasks refer to your personal information, a user ID is provided. As you complete all the tasks, please fill out the usability and credibility questionnaires. During the questionnaire period, the e-government site will still be available for you to interact with to support answering the questions.

The information you give will be entirely confidential and will not be shared with any other people not directly connected with this study. Your contribution is much appreciated. If you have any questions, please feel free to contact us.

Enjoying completing the experiment!

Many thanks

Zhao Huang

Appendix 7b: Information sheet for experiment 2



Information sheet

Dear participants:

Many thanks for agreeing to take part in the experiment! My name is Zhao Huang (Zhao.huang@brunel.ac.uk), a second year PhD student in the Information System and Computing Department, Brunel University. This project is conducted under the supervision of Dr. Laurence Brooks, Dr. Sherry Chen and Dr. George Ghinea (Dr. Laurence Brooks: Laurence.brooks@brunel.ac.uk; Dr. Sherry Chen: Dr.Sherry.chen@brunel.ac.uk; Dr. George Ghinea: George.ghinea@brunel.ac.uk). This is the second experiment. The purpose of this experiment is to assess the effects of the proposed design solutions on the target e-government websites.

At the beginning of the experiment, you will be given five minutes to look through an e-government website. Subsequently, you are required to do some tasks using the e-government website. It would be grateful if you could do the tasks in order. Once you finish one task, please show your task result to the observer. When you are ready for the next task, please go to e-government home page to start again. If any tasks refer to your personal information, a user ID is provided. As you complete all the tasks, please fill out the usability and credibility questionnaires. During the questionnaire period, the e-government site will still be available for you to interact with to support answering the questions.

The information you give will be entirely confidential and will not be shared with any other people not directly connected with this study. Your contribution is much appreciated. If you have any questions, please feel free to contact us.

Enjoying completing the experiment!

Many thanks

Zhao Huang

Appendix 8a: Results of users' perception of usability and credibility for London Authority 1 in experiment 1

Mean of each usability and credibility question

	N		Mean	Std. Deviation
	Valid	Missing		
Usability question1	12	0	3.83	.835
Usability question2	12	0	3.50	1.000
Usability question3	12	0	3.42	1.084
Usability question4	12	0	3.67	1.371
Usability question5	12	0	3.58	.996
Usability question6	12	0	3.08	1.084
Usability question7	12	0	3.25	1.055
Usability question8	12	0	3.17	1.030
Usability question9	12	0	3.25	1.288
Usability question10	12	0	3.75	.622
Usability question11	12	0	3.67	1.073
Usability question12	12	0	4.08	.793
Usability question13	12	0	3.83	.937
Usability question14	12	0	3.83	.937
Usability question15	12	0	3.17	1.115
Usability question16	12	0	3.58	.996
Usability question17	12	0	3.25	1.138
Usability question18	12	0	3.67	.985
Usability question19	12	0	3.25	1.138
Usability question20	12	0	3.42	1.240
Usability question21	12	0	3.17	.835
Usability question22	12	0	3.75	.754
Usability question23	12	0	3.17	1.115
Usability question24	12	0	3.00	1.477
Usability question25	12	0	3.83	.835
Usability question26	12	0	4.00	1.128
Usability question27	12	0	2.75	1.215
Usability question28	12	0	2.83	1.267
Usability question29	12	0	3.08	.669
Usability question30	12	0	3.50	1.000
Usability question31	12	0	3.50	.798
Usability question32	12	0	3.58	1.084
Usability question33	12	0	2.32	1.084
Usability question34	12	0	2.83	1.115
Usability question35	12	0	3.58	.996
Usability question36	12	0	3.58	.793
Usability question37	12	0	3.67	1.155
Usability question38	12	0	3.50	.674
Usability question39	12	0	3.42	.996
Usability question40	12	0	2.33	1.155
Usability question41	12	0	2.75	.866
Usability question42	12	0	3.42	.900
Usability question43	12	0	3.33	.778
Usability question44	12	0	3.92	.515
Usability question45	12	0	3.92	.900

Usability question46	12	0	3.75	.866
Usability question47	12	0	4.33	.492
Usability question48	12	0	3.58	.793
Usability question49	12	0	3.83	.937
Usability question50	12	0	3.67	.651
Credibility question1	12	0	4.25	.452
Credibility question2	12	0	2.58	.996
Credibility question3	12	0	4.00	.739
Credibility question4	12	0	3.58	.669
Credibility question5	12	0	3.67	1.155
Credibility question6	12	0	3.50	.905
Credibility question7	12	0	3.50	.798
Credibility question8	12	0	4.33	.651
Credibility question9	12	0	3.83	1.193
Credibility question10	12	0	3.75	.754
Credibility question11	12	0	3.58	.900
Credibility question12	12	0	3.83	1.030
Credibility question13	12	0	3.83	.937
Credibility question14	12	0	3.33	1.303
Credibility question15	12	0	4.00	.953
Credibility question16	12	0	3.75	.965
Credibility question17	12	0	3.75	1.215
Credibility question18	12	0	3.67	1.303
Credibility question19	12	0	3.75	.965
Credibility question20	12	0	3.75	1.357
Credibility question21	12	0	3.33	1.155
Credibility question22	12	0	3.42	1.084
Credibility question23	12	0	3.17	1.193
Credibility question24	12	0	3.42	.900
Credibility question25	12	0	3.17	1.030
Credibility question26	12	0	3.83	.718
Credibility question27	12	0	3.50	.798
Credibility question28	12	0	3.83	.937
Credibility question29	12	0	3.83	1.030
Credibility question30	12	0	3.67	.985
Credibility question31	12	0	3.83	1.030
Credibility question32	12	0	3.92	.669
Credibility question33	12	0	4.00	.739
Credibility question34	12	0	3.92	.900
Credibility question35	12	0	4.17	.835
Credibility question36	12	0	3.58	.900
Credibility question37	12	0	3.58	.900
Credibility question38	12	0	4.17	.718
Credibility question39	12	0	3.67	.778

Usability strengths and problems identification

	Test Value = 3.45					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Usability question1	1.591	11	.140	.383	-.15	.91

Usability question2	.173	11	.866	.050	-.59	.69
Usability question3	-.107	11	.917	-.033	-.72	.66
Usability question4	.548	11	.595	.217	-.65	1.09
Usability question5	.464	11	.652	.133	-.50	.77
Usability question6	-1.172	11	.266	-.367	-1.06	.32
Usability question7	-.657	11	.525	-.200	-.87	.47
Usability question8	-.953	11	.361	-.283	-.94	.37
Usability question9	-.538	11	.601	-.200	-1.02	.62
Usability question10	1.672	11	.123	.300	-.09	.69
Usability question11	.699	11	.499	.217	-.47	.90
Usability question12	2.767	11	.018	.633	.13	1.14
Usability question13	1.417	11	.184	.383	-.21	.98
Usability question14	1.417	11	.184	.383	-.21	.98
Usability question15	-.881	11	.397	-.283	-.99	.42
Usability question16	.464	11	.652	.133	-.50	.77
Usability question17	-.609	11	.555	-.200	-.92	.52
Usability question18	.762	11	.462	.217	-.41	.84
Usability question19	-.609	11	.555	-.200	-.92	.52
Usability question20	-.093	11	.927	-.033	-.82	.75
Usability question21	-1.176	11	.265	-.283	-.81	.25
Usability question22	1.379	11	.195	.300	-.18	.78
Usability question23	-.881	11	.397	-.283	-.99	.42
Usability question24	-1.055	11	.314	-.450	-1.39	.49
Usability question25	1.591	11	.140	.383	-.15	.91
Usability question26	1.689	11	.119	.550	-.17	1.27
Usability question27	-1.995	11	.071	-.700	-1.47	.07
Usability question28	-1.686	11	.120	-.617	-1.42	.19
Usability question29	-1.900	11	.084	-.367	-.79	.06
Usability question30	.173	11	.866	.050	-.59	.69
Usability question31	.217	11	.832	.050	-.46	.56
Usability question32	.426	11	.678	.133	-.56	.82
Usability question33	-3.303	11	.007	-1.033	-1.72	-.34
Usability question34	-1.916	11	.082	-.617	-1.32	.09
Usability question35	.464	11	.652	.133	-.50	.77
Usability question36	.582	11	.572	.133	-.37	.64
Usability question37	.650	11	.529	.217	-.52	.95
Usability question38	.257	11	.802	.050	-.38	.48
Usability question39	-.116	11	.910	-.033	-.67	.60
Usability question40	-3.350	11	.006	-1.117	-1.85	-.38
Usability question41	-2.800	11	.017	-.700	-1.25	-.15
Usability question42	-.128	11	.900	-.033	-.61	.54
Usability question43	-.519	11	.614	-.117	-.61	.38
Usability question44	3.139	11	.009	.467	.14	.79
Usability question45	1.796	11	.100	.467	-.11	1.04
Usability question46	1.200	11	.255	.300	-.25	.85
Usability question47	6.215	11	.000	.883	.57	1.20
Usability question48	.582	11	.572	.133	-.37	.64
Usability question49	1.417	11	.184	.383	-.21	.98
Usability question50	1.152	11	.274	.217	-.20	.63

Credibility strengths and problems identification

	Test Value = 3.70
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	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Credibility question1	4.213	11	.001	.550	.26	.84
Credibility question2	-3.883	11	.003	-1.117	-1.75	-.48
Credibility question3	1.407	11	.187	.300	-.17	.77
Credibility question4	-.605	11	.558	-.117	-.54	.31
Credibility question5	-.100	11	.922	-.033	-.77	.70
Credibility question6	-.766	11	.460	-.200	-.77	.37
Credibility question7	-.868	11	.404	-.200	-.71	.31
Credibility question8	3.368	11	.006	.633	.22	1.05
Credibility question9	.387	11	.706	.133	-.62	.89
Credibility question10	.230	11	.822	.050	-.43	.53
Credibility question11	-.449	11	.662	-.117	-.69	.46
Credibility question12	.448	11	.663	.133	-.52	.79
Credibility question13	.493	11	.632	.133	-.46	.73
Credibility question14	-.975	11	.350	-.367	-1.19	.46
Credibility question15	1.090	11	.299	.300	-.31	.91
Credibility question16	.179	11	.861	.050	-.56	.66
Credibility question17	.143	11	.889	.050	-.72	.82
Credibility question18	-.089	11	.931	-.033	-.86	.79
Credibility question19	.179	11	.861	.050	-.56	.66
Credibility question20	.128	11	.901	.050	-.81	.91
Credibility question21	-1.100	11	.295	-.367	-1.10	.37
Credibility question22	-.906	11	.384	-.283	-.97	.41
Credibility question23	-1.548	11	.150	-.533	-1.29	.22
Credibility question24	-1.090	11	.299	-.283	-.86	.29
Credibility question25	-1.794	11	.100	-.533	-1.19	.12
Credibility question26	.644	11	.533	.133	-.32	.59
Credibility question27	-.868	11	.404	-.200	-.71	.31
Credibility question28	.493	11	.632	.133	-.46	.73
Credibility question29	.448	11	.663	.133	-.52	.79
Credibility question30	-.117	11	.909	-.033	-.66	.59
Credibility question31	.448	11	.663	.133	-.52	.79

Credibility question32	1.123	11	.285	.217	-.21	.64
Credibility question33	1.407	11	.187	.300	-.17	.77
Credibility question34	.834	11	.422	.217	-.36	.79
Credibility question35	1.936	11	.079	.467	-.06	1.00
Credibility question36	-.449	11	.662	-.117	-.69	.46
Credibility question37	-.449	11	.662	-.117	-.69	.46
Credibility question38	2.252	11	.046	.467	.01	.92
Credibility question39	-.148	11	.885	-.033	-.53	.46

Appendix 8b: Results of users' perception of usability and credibility for London Authority 2 in experiment 1

Mean of each usability and credibility question

	N		Mean	Std. Deviation
	Valid	Missing		
Usability question1	12	0	3.92	.793
Usability question2	12	0	3.25	1.055
Usability question3	12	0	2.92	1.240
Usability question4	12	0	2.92	.793
Usability question5	12	0	3.33	.778
Usability question6	12	0	2.33	.888
Usability question7	12	0	3.17	.835
Usability question8	12	0	2.92	1.240
Usability question9	12	0	3.00	1.044
Usability question10	12	0	3.75	.754
Usability question11	12	0	3.33	.985
Usability question12	12	0	2.83	1.267
Usability question13	12	0	3.50	1.000
Usability question14	12	0	3.83	.718
Usability question15	12	0	2.83	1.030
Usability question16	12	0	3.17	1.030
Usability question17	12	0	3.42	1.311
Usability question18	12	0	3.75	.622
Usability question19	12	0	2.67	.778
Usability question20	12	0	3.00	1.128
Usability question21	12	0	2.92	.900
Usability question22	12	0	3.42	1.084
Usability question23	12	0	3.42	1.165
Usability question24	12	0	2.17	1.030
Usability question25	12	0	3.25	.965
Usability question26	12	0	4.25	.452
Usability question27	12	0	3.50	1.087
Usability question28	12	0	3.33	.985
Usability question29	12	0	3.42	.793
Usability question30	12	0	4.17	.577
Usability question31	12	0	3.58	1.311
Usability question32	12	0	2.50	1.243
Usability question33	12	0	2.25	.866
Usability question34	12	0	3.33	.778
Usability question35	12	0	3.42	1.165
Usability question36	12	0	3.42	1.084
Usability question37	12	0	3.92	.996
Usability question38	12	0	3.50	1.000
Usability question39	12	0	3.33	1.155
Usability question40	12	0	3.42	.996
Usability question41	12	0	3.08	1.165
Usability question42	12	0	3.42	.996
Usability question43	12	0	3.58	.669
Usability question44	12	0	3.50	.798

Usability question45	12	0	3.42	.793
Usability question46	12	0	3.75	.452
Usability question47	12	0	4.00	.853
Usability question48	12	0	3.83	.835
Usability question49	12	0	3.67	.778
Usability question50	12	0	3.58	.900
Credibility question1	12	0	4.08	.515
Credibility question2	12	0	2.67	.985
Credibility question3	12	0	3.67	.888
Credibility question4	12	0	3.33	1.073
Credibility question5	12	0	3.50	.522
Credibility question6	12	0	3.42	.900
Credibility question7	12	0	3.75	.622
Credibility question8	12	0	3.83	.577
Credibility question9	12	0	3.92	.996
Credibility question10	12	0	3.50	1.000
Credibility question11	12	0	3.58	.669
Credibility question12	12	0	3.67	.778
Credibility question13	12	0	3.33	.985
Credibility question14	12	0	3.25	.965
Credibility question15	12	0	3.08	.900
Credibility question16	12	0	3.50	1.087
Credibility question17	12	0	3.25	1.288
Credibility question18	12	0	3.33	.985
Credibility question19	12	0	3.42	.793
Credibility question20	12	0	3.08	.996
Credibility question21	12	0	3.08	.793
Credibility question22	12	0	3.25	1.055
Credibility question23	12	0	2.75	1.138
Credibility question24	12	0	2.43	.937
Credibility question25	12	0	2.67	1.231
Credibility question26	12	0	4.00	.739
Credibility question27	12	0	3.58	.900
Credibility question28	12	0	3.83	.718
Credibility question29	12	0	3.83	.835
Credibility question30	12	0	3.75	.622
Credibility question31	12	0	3.58	.793
Credibility question32	12	0	3.25	.965
Credibility question33	12	0	3.83	1.030
Credibility question34	12	0	3.75	.754
Credibility question35	12	0	3.83	.835
Credibility question36	12	0	3.25	.866
Credibility question37	12	0	3.42	.900
Credibility question38	12	0	3.42	.900
Credibility question39	12	0	2.92	.515

Usability strengths and problems identification

	Test Value = 3.32				95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper

Usability question1	2.607	11	.024	.597	.09	1.10
Usability question2	-.230	11	.822	-.070	-.74	.60
Usability question3	-1.127	11	.284	-.403	-1.19	.38
Usability question4	-1.762	11	.106	-.403	-.91	.10
Usability question5	.059	11	.954	.013	-.48	.51
Usability question6	-3.851	11	.003	-.987	-1.55	-.42
Usability question7	-.636	11	.538	-.153	-.68	.38
Usability question8	-1.127	11	.284	-.403	-1.19	.38
Usability question9	-1.061	11	.311	-.320	-.98	.34
Usability question10	1.976	11	.074	.430	-.05	.91
Usability question11	.047	11	.963	.013	-.61	.64
Usability question12	-1.330	11	.210	-.487	-1.29	.32
Usability question13	.624	11	.546	.180	-.46	.82
Usability question14	2.478	11	.031	.513	.06	.97
Usability question15	-1.637	11	.130	-.487	-1.14	.17
Usability question16	-.516	11	.616	-.153	-.81	.50
Usability question17	.255	11	.803	.097	-.74	.93
Usability question18	2.396	11	.035	.430	.04	.82
Usability question19	-2.907	11	.014	-.653	-1.15	-.16
Usability question20	-.983	11	.347	-.320	-1.04	.40
Usability question21	-1.552	11	.149	-.403	-.98	.17
Usability question22	.309	11	.763	.097	-.59	.79
Usability question23	.288	11	.779	.097	-.64	.84
Usability question24	-3.879	11	.003	-1.153	-1.81	-.50
Usability question25	-.251	11	.806	-.070	-.68	.54
Usability question26	7.123	11	.000	.930	.64	1.22
Usability question27	.574	11	.578	.180	-.51	.87
Usability question28	.047	11	.963	.013	-.61	.64
Usability question29	.422	11	.681	.097	-.41	.60
Usability question30	5.080	11	.000	.847	.48	1.21
Usability question31	.696	11	.501	.263	-.57	1.10
Usability question32	-2.285	11	.043	-.820	-1.61	-.03
Usability question33	-4.280	11	.001	-1.070	-1.62	-.52
Usability question34	.059	11	.954	.013	-.48	.51
Usability question35	.288	11	.779	.097	-.64	.84
Usability question36	.309	11	.763	.097	-.59	.79
Usability question37	2.075	11	.062	.597	-.04	1.23
Usability question38	.624	11	.546	.180	-.46	.82
Usability question39	.040	11	.969	.013	-.72	.75
Usability question40	.336	11	.743	.097	-.54	.73
Usability question41	-.704	11	.496	-.237	-.98	.50
Usability question42	.336	11	.743	.097	-.54	.73
Usability question43	1.364	11	.200	.263	-.16	.69
Usability question44	.782	11	.451	.180	-.33	.69
Usability question45	.422	11	.681	.097	-.41	.60
Usability question46	3.294	11	.007	.430	.14	.72
Usability question47	2.762	11	.018	.680	.14	1.22
Usability question48	2.130	11	.057	.513	-.02	1.04
Usability question49	1.543	11	.151	.347	-.15	.84
Usability question50	1.013	11	.333	.263	-.31	.84

Credibility strengths and problems identification

	Test Value = 3.44					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Credibility question1	4.328	11	.001	.643	.32	.97
Credibility question2	-2.720	11	.020	-.773	-1.40	-.15
Credibility question3	.885	11	.395	.227	-.34	.79
Credibility question4	-.344	11	.737	-.107	-.79	.58
Credibility question5	.398	11	.698	.060	-.27	.39
Credibility question6	-.090	11	.930	-.023	-.60	.55
Credibility question7	1.728	11	.112	.310	-.08	.70
Credibility question8	2.360	11	.038	.393	.03	.76
Credibility question9	1.658	11	.126	.477	-.16	1.11
Credibility question10	.208	11	.839	.060	-.58	.70
Credibility question11	.743	11	.473	.143	-.28	.57
Credibility question12	1.009	11	.335	.227	-.27	.72
Credibility question13	-.375	11	.715	-.107	-.73	.52
Credibility question14	-.682	11	.509	-.190	-.80	.42
Credibility question15	-1.372	11	.197	-.357	-.93	.22
Credibility question16	.191	11	.852	.060	-.63	.75
Credibility question17	-.511	11	.619	-.190	-1.01	.63
Credibility question18	-.375	11	.715	-.107	-.73	.52
Credibility question19	-.102	11	.921	-.023	-.53	.48
Credibility question20	-1.240	11	.241	-.357	-.99	.28
Credibility question21	-1.558	11	.147	-.357	-.86	.15
Credibility question22	-.624	11	.546	-.190	-.86	.48
Credibility question23	-2.100	11	.060	-.690	-1.41	.03
Credibility question24	-2.242	11	.047	-.607	-1.20	-.01
Credibility question25	-2.176	11	.052	-.773	-1.56	.01
Credibility question26	2.627	11	.024	.560	.09	1.03
Credibility question27	.551	11	.592	.143	-.43	.72
Credibility question28	1.898	11	.084	.393	-.06	.85
Credibility question29	1.632	11	.131	.393	-.14	.92
Credibility question30	1.728	11	.112	.310	-.08	.70

Credibility question31	.626	11	.544	.143	-.36	.65
Credibility question32	-.682	11	.509	-.190	-.80	.42
Credibility question33	1.323	11	.213	.393	-.26	1.05
Credibility question34	1.425	11	.182	.310	-.17	.79
Credibility question35	1.632	11	.131	.393	-.14	.92
Credibility question36	-.760	11	.463	-.190	-.74	.36
Credibility question37	-.090	11	.930	-.023	-.60	.55
Credibility question38	-.090	11	.930	-.023	-.60	.55
Credibility question39	-3.521	11	.005	-.523	-.85	-.20

Appendix 8c: Results of users' perception of usability and credibility for London Authority 3 in experiment 1

Mean of each usability and credibility question

	N		Mean	Std. Deviation
	Valid	Missing		
Usability question1	12	0	4.58	.669
Usability question2	12	0	3.17	1.267
Usability question3	12	0	3.75	1.055
Usability question4	12	0	4.08	.900
Usability question5	12	0	4.33	.985
Usability question6	12	0	3.58	1.165
Usability question7	12	0	3.67	.985
Usability question8	12	0	3.25	1.055
Usability question9	12	0	2.83	1.030
Usability question10	12	0	3.92	1.084
Usability question11	12	0	4.00	1.206
Usability question12	12	0	3.58	1.379
Usability question13	12	0	3.00	.853
Usability question14	12	0	4.08	.793
Usability question15	12	0	4.00	.953
Usability question16	12	0	2.83	1.030
Usability question17	12	0	3.75	.965
Usability question18	12	0	4.67	.492
Usability question19	12	0	3.75	1.055
Usability question20	12	0	3.75	1.055
Usability question21	12	0	4.00	1.044
Usability question22	12	0	4.00	1.044
Usability question23	12	0	4.50	.674
Usability question24	12	0	2.92	.793
Usability question25	12	0	4.08	.793
Usability question26	12	0	4.33	.888
Usability question27	12	0	4.08	.996
Usability question28	12	0	4.08	1.084
Usability question29	12	0	3.83	.835
Usability question30	12	0	4.25	1.055
Usability question31	12	0	4.00	1.044
Usability question32	12	0	2.92	1.084
Usability question33	12	0	2.58	.669
Usability question34	12	0	3.50	1.000
Usability question35	12	0	3.33	.888
Usability question36	12	0	3.33	.985
Usability question37	12	0	3.83	1.030
Usability question38	12	0	4.42	.793
Usability question39	12	0	3.42	1.084
Usability question40	12	0	4.00	.953
Usability question41	12	0	4.17	.835
Usability question42	12	0	3.92	.793
Usability question43	12	0	4.33	.985
Usability question44	12	0	4.33	.778
Usability question45	12	0	4.42	.669
Usability question46	12	0	4.67	.492

Usability question47	12	0	4.25	.622
Usability question48	12	0	4.00	.953
Usability question49	12	0	4.25	.866
Usability question50	12	0	3.83	1.030
Credibility question1	12	0	4.25	.754
Credibility question2	12	0	3.25	.754
Credibility question3	12	0	4.25	.754
Credibility question4	12	0	4.00	1.348
Credibility question5	12	0	3.92	.669
Credibility question6	12	0	2.83	.835
Credibility question7	12	0	4.58	.669
Credibility question8	12	0	4.83	.389
Credibility question9	12	0	4.67	.492
Credibility question10	12	0	3.42	.996
Credibility question11	12	0	4.17	.937
Credibility question12	12	0	4.33	.985
Credibility question13	12	0	4.50	.674
Credibility question14	12	0	3.42	.793
Credibility question15	12	0	3.08	.996
Credibility question16	12	0	2.75	.754
Credibility question17	12	0	3.33	.651
Credibility question18	12	0	4.75	.452
Credibility question19	12	0	4.25	.866
Credibility question20	12	0	2.75	.866
Credibility question21	12	0	4.58	.793
Credibility question22	12	0	4.25	.965
Credibility question23	12	0	3.17	.937
Credibility question24	12	0	3.50	1.000
Credibility question25	12	0	3.17	1.030
Credibility question26	12	0	4.92	.289
Credibility question27	12	0	4.00	.853
Credibility question28	12	0	3.50	.905
Credibility question29	12	0	4.25	.754
Credibility question30	12	0	4.25	.866
Credibility question31	12	0	4.08	1.084
Credibility question32	12	0	3.92	1.084
Credibility question33	12	0	4.17	.835
Credibility question34	12	0	3.42	.900
Credibility question35	12	0	4.33	.778
Credibility question36	12	0	4.25	.866
Credibility question37	12	0	4.17	.937
Credibility question38	12	0	3.17	.937
Credibility question39	12	0	3.08	.515

Usability strengths and problems identification

	Test Value = 3.84					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Usability question1	3.852	11	.003	.743	.32	1.17
Usability question2	-1.841	11	.093	-.673	-1.48	.13

Usability question3	-.295	11	.773	-.090	-.76	.58
Usability question4	.936	11	.369	.243	-.33	.82
Usability question5	1.735	11	.111	.493	-.13	1.12
Usability question6	-.764	11	.461	-.257	-1.00	.48
Usability question7	-.610	11	.554	-.173	-.80	.45
Usability question8	-1.937	11	.079	-.590	-1.26	.08
Usability question9	-3.386	11	.006	-1.007	-1.66	-.35
Usability question10	.245	11	.811	.077	-.61	.77
Usability question11	.460	11	.655	.160	-.61	.93
Usability question12	-.645	11	.532	-.257	-1.13	.62
Usability question13	-3.412	11	.006	-.840	-1.38	-.30
Usability question14	1.063	11	.311	.243	-.26	.75
Usability question15	.581	11	.573	.160	-.45	.77
Usability question16	-3.386	11	.006	-1.007	-1.66	-.35
Usability question17	-.323	11	.753	-.090	-.70	.52
Usability question18	5.816	11	.000	.827	.51	1.14
Usability question19	-.295	11	.773	-.090	-.76	.58
Usability question20	-.295	11	.773	-.090	-.76	.58
Usability question21	.531	11	.606	.160	-.50	.82
Usability question22	.531	11	.606	.160	-.50	.82
Usability question23	3.391	11	.006	.660	.23	1.09
Usability question24	-4.034	11	.002	-.923	-1.43	-.42
Usability question25	1.063	11	.311	.243	-.26	.75
Usability question26	1.925	11	.080	.493	-.07	1.06
Usability question27	.846	11	.416	.243	-.39	.88
Usability question28	.778	11	.453	.243	-.45	.93
Usability question29	-.028	11	.978	-.007	-.54	.52
Usability question30	1.346	11	.205	.410	-.26	1.08
Usability question31	.531	11	.606	.160	-.50	.82
Usability question32	-2.952	11	.013	-.923	-1.61	-.23
Usability question33	-6.511	11	.000	-1.257	-1.68	-.83
Usability question34	-1.178	11	.264	-.340	-.98	.30
Usability question35	-1.977	11	.074	-.507	-1.07	.06
Usability question36	-1.782	11	.102	-.507	-1.13	.12
Usability question37	-.022	11	.983	-.007	-.66	.65
Usability question38	2.519	11	.029	.577	.07	1.08
Usability question39	-1.353	11	.203	-.423	-1.11	.27
Usability question40	.581	11	.573	.160	-.45	.77
Usability question41	1.355	11	.202	.327	-.20	.86
Usability question42	.335	11	.744	.077	-.43	.58
Usability question43	1.735	11	.111	.493	-.13	1.12
Usability question44	2.195	11	.051	.493	.00	.99
Usability question45	2.988	11	.012	.577	.15	1.00
Usability question46	5.816	11	.000	.827	.51	1.14
Usability question47	2.285	11	.043	.410	.02	.80
Usability question48	.581	11	.573	.160	-.45	.77
Usability question49	1.640	11	.129	.410	-.14	.96
Usability question50	-.022	11	.983	-.007	-.66	.65

Credibility strengths and problems identification

	Test Value = 3.89
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	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Credibility question1	1.654	11	.126	.360	-.12	.84
Credibility question2	-2.941	11	.013	-.640	-1.12	-.16
Credibility question3	1.654	11	.126	.360	-.12	.84
Credibility question4	.283	11	.783	.110	-.75	.97
Credibility question5	.138	11	.893	.027	-.40	.45
Credibility question6	-4.385	11	.001	-1.057	-1.59	-.53
Credibility question7	3.592	11	.004	.693	.27	1.12
Credibility question8	8.395	11	.000	.943	.70	1.19
Credibility question9	5.464	11	.000	.777	.46	1.09
Credibility question10	-1.646	11	.128	-.473	-1.11	.16
Credibility question11	1.022	11	.329	.277	-.32	.87
Credibility question12	1.560	11	.147	.443	-.18	1.07
Credibility question13	3.134	11	.010	.610	.18	1.04
Credibility question14	-2.068	11	.063	-.473	-.98	.03
Credibility question15	-2.805	11	.017	-.807	-1.44	-.17
Credibility question16	-5.239	11	.000	-1.140	-1.62	-.66
Credibility question17	-2.961	11	.013	-.557	-.97	-.14
Credibility question18	6.587	11	.000	.860	.57	1.15
Credibility question19	1.440	11	.178	.360	-.19	.91
Credibility question20	-4.560	11	.001	-1.140	-1.69	-.59
Credibility question21	3.029	11	.011	.693	.19	1.20
Credibility question22	1.292	11	.223	.360	-.25	.97
Credibility question23	-2.673	11	.022	-.723	-1.32	-.13
Credibility question24	-1.351	11	.204	-.390	-1.03	.25
Credibility question25	-2.433	11	.033	-.723	-1.38	-.07
Credibility question26	12.320	11	.000	1.027	.84	1.21
Credibility question27	.447	11	.664	.110	-.43	.65
Credibility question28	-1.494	11	.163	-.390	-.96	.18
Credibility question29	1.654	11	.126	.360	-.12	.84
Credibility question30	1.440	11	.178	.360	-.19	.91
Credibility question31	.618	11	.549	.193	-.50	.88

Credibility question32	.085	11	.934	.027	-.66	.72
Credibility question33	1.148	11	.275	.277	-.25	.81
Credibility question34	-1.821	11	.096	-.473	-1.05	.10
Credibility question35	1.973	11	.074	.443	-.05	.94
Credibility question36	1.440	11	.178	.360	-.19	.91
Credibility question37	1.022	11	.329	.277	-.32	.87
Credibility question38	-2.673	11	.022	-.723	-1.32	-.13
Credibility question39	-5.427	11	.000	-.807	-1.13	-.48

Appendix 9a: Results of users' performance with London Authority 1 in experiment 1

Performance results

	N	Minimum	Maximum	Mean	Std. Deviation
total time for all tasks	12	13.20	43.91	26.6267	8.90527
total steps for all tasks	12	44.00	86.00	60.4167	13.10419
total helps for all tasks	12	.00	1.00	.2500	.45227
overall completion for all tasks	12	9.00	12.00	10.2500	1.05529
Valid N (listwise)	12				

Appendix 9b: Results of users' performance with London Authority 2 in experiment 1

Performance results

	N	Minimum	Maximum	Mean	Std. Deviation
total time for all tasks	12	12.61	38.71	21.7208	8.57907
total steps for all asks	12	49.00	115.00	81.8333	20.68743
total helps for all tasks	12	.00	2.00	.5833	.66856
overall completion for all tasks	12	9.00	12.00	10.3333	.77850
Valid N (listwise)	12				

Appendix 9c: Results of users' performance with London Authority 3 in experiment 1

Performance results

	N	Minimum	Maximum	Mean	Std. Deviation
total time for all tasks	12	7.39	31.14	16.2092	8.10166
total steps for all tasks	12	28.00	84.00	50.1667	16.29742
total helps for all tasks	12	.00	.00	.0000	.00000
overall completion for all tasks	12	9.00	11.00	9.5833	.79296
Valid N (listwise)	12				

Appendix 10a: Results of users' perception of usability and credibility for the redesigned London Authority 1 in experiment 2

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Usability question40	2.33	12	1.155	.333
	experiment 2 usability 1 - uq40	4.50	12	.522	.151
Pair 2	Usability question33	2.42	12	1.084	.313
	experiment 2 usability 2 - uq33	4.67	12	.651	.188
Pair 3	Usability question41	2.75	12	.866	.250
	experiment 2 usability 3 - uq41	4.50	12	.522	.151
Pair 4	Credibility question2	2.58	12	.996	.288
	experiment 2 credibility 1 - cq2	3.83	12	1.267	.366

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Usability question40 & experiment 2 usability 1 - uq40	12	.000	1.000
Pair 2	Usability question33 & experiment 2 usability 2 - uq33	12	.343	.274
Pair 3	Usability question41 & experiment 2 usability 3 - uq41	12	-.101	.756
Pair 4	Credibility question2 & experiment 2 credibility 1 - cq2	12	-.060	.853

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Usability question40 - experiment 2 usability 1 - uq40	-2.167	1.267	.366	-2.972	-1.361	-5.922	11	.000
Pair 2	Usability question33 - experiment 2 usability 2 - uq33	-2.250	1.055	.305	-2.920	-1.580	-7.386	11	.000

Pair 3	Usability question41 - experiment 2 usability 3 - uq41	-1.750	1.055	.305	-2.420	-1.080	-5.745	11	.000
Pair 4	Credibility question2 - experiment 2 credibility 1 - cq2	-1.250	1.658	.479	-2.304	-.196	-2.611	11	.024

Appendix 10b: Results of users' perception of usability and credibility for the redesigned London Authority 2 in experiment 2

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Usability question33	2.25	12	.866	.250
	experiment 2 usability 1 - uq33	4.00	12	.853	.246
Pair 2	Usability question24	2.17	12	1.030	.297
	experiment 2 usability 2 - uq24	3.92	12	.793	.229
Pair 3	Usability question6	2.33	12	.888	.256
	experiment 2 usability 3 - uq6	4.33	12	.492	.142
Pair 4	Usability question32	2.50	12	1.243	.359
	experiment 2 usability 4 - uq32	3.92	12	.793	.229
Pair 5	Usability question19	2.67	12	.778	.225
	experiment 2 usability 5 - uq19	4.25	12	.622	.179
Pair 6	Credibility question2	2.67	12	.985	.284
	experiment 2 credibility 1 - cq2	4.17	12	1.115	.322
Pair 7	Credibility question24	2.83	12	.937	.271
	experiment 2 credibility 2 - cq24	4.58	12	.515	.149
Pair 8	Credibility question39	2.92	12	.515	.149
	experiment 2 credibility 3 - cq39	4.50	12	.522	.151

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Usability question33 & experiment 2 usability 1 - uq33	12	-.123	.703
Pair 2	Usability question24 & experiment 2 usability 2 - uq24	12	-.093	.774
Pair 3	Usability question6 & experiment 2 usability 3 - uq6	12	.347	.270
Pair 4	Usability question32 & experiment 2 usability 4 - uq32	12	.784	.003
Pair 5	Usability question19 & experiment 2 usability 5 - uq19	12	-.188	.559
Pair 6	Credibility question2 & experiment 2 credibility 1 - cq2	12	.304	.337

Pair 7	Credibility question24 & experiment 2 credibility 2 - cq24	12	-.157	.626
Pair 8	Credibility question39 & experiment 2 credibility 3 - cq39	12	-.169	.599

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Usability question33 - experiment 2 usability 1 - uq33	-1.750	1.288	.372	-2.568	-.932	-4.706	11	.001
Pair 2	Usability question24 - experiment 2 usability 2 - uq24	-1.750	1.357	.392	-2.612	-.888	-4.468	11	.001
Pair 3	Usability question6 - experiment 2 usability 3 - uq6	-2.000	.853	.246	-2.542	-1.458	-8.124	11	.000
Pair 4	Usability question32 - experiment 2 usability 4 - uq32	-1.417	.793	.229	-1.920	-.913	-6.189	11	.000
Pair 5	Usability question19 - experiment 2 usability 5 - uq19	-1.583	1.084	.313	-2.272	-.895	-5.062	11	.000
Pair 6	Credibility question2 - experiment 2 credibility 1 - cq2	-1.500	1.243	.359	-2.290	-.710	-4.180	11	.002
Pair 7	Credibility question24 - experiment 2 credibility 2 - cq24	-1.750	1.138	.329	-2.473	-1.027	-5.326	11	.000
Pair 8	Credibility question39 - experiment 2 credibility 3 - cq39	-1.583	.793	.229	-2.087	-1.080	-6.917	11	.000

Appendix 10c: Results of users' perception of usability and credibility for the redesigned London Authority 3 in experiment 2

Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 Usability question33	2.58	12	.669	.193
experiment 2 usability 1 - uq33	4.33	12	.492	.142
Pair 2 Usability question32	2.92	12	1.084	.313
experiment 2 usability 2 - uq32	3.58	12	1.165	.336
Pair 3 Usability question9	2.83	12	1.030	.297
experiment 2 usability 3 - uq9	3.42	12	.900	.260
Pair 4 Usability question16	2.83	12	1.030	.297
experiment 2 usability 4 - uq16	4.17	12	.577	.167
Pair 5 Usability question13	3.00	12	.853	.246
experiment 2 usability 5 - uq13	3.75	12	1.215	.351
Pair 6 Credibility question39	3.08	12	.515	.149
experiment 2 credibility 1 - cq39	4.42	12	.515	.149
Pair 7 Credibility question20	2.75	12	.866	.250
experiment 2 credibility 2 - cq20	3.50	12	1.000	.289
Pair 8 Credibility question16	2.75	12	.754	.218
experiment 2 credibility 3 - cq16	4.25	12	.452	.131
Pair 9 Credibility question15	3.08	12	.996	.288
experiment 2 credibility 4 - cq15	4.50	12	.522	.151
Pair 10 Credibility question23	3.17	12	.937	.271
experiment 2 credibility 5 - cq23	4.00	12	1.044	.302
Pair 11 Credibility question25	3.17	12	1.030	.297
experiment 2 credibility 6 - cq25	4.50	12	.522	.151
Pair 12 Credibility question38	3.17	12	.937	.271
experiment 2 credibility 7 - cq38	4.25	12	.452	.131

Paired Samples Correlations

	N	Correlation	Sig.
Pair 1 Usability question33 & experiment 2 usability 1 - uq33	12	.184	.567

Pair 2	Usability question32 & experiment 2 usability 2 - uq32	12	.258	.418
Pair 3	Usability question9 & experiment 2 usability 3 - uq9	12	.180	.576
Pair 4	Usability question16 & experiment 2 usability 4 - uq16	12	.051	.875
Pair 5	Usability question13 & experiment 2 usability 5 - uq13	12	-.263	.409
Pair 6	Credibility question39 & experiment 2 credibility 1 - cq39	12	-.143	.658
Pair 7	Credibility question20 & experiment 2 credibility 2 - cq20	12	.472	.121
Pair 8	Credibility question16 & experiment 2 credibility 3 - cq16	12	.200	.533
Pair 9	Credibility question15 & experiment 2 credibility 4 - cq15	12	-.087	.787
Pair 10	Credibility question23 & experiment 2 credibility 5 - cq23	12	.279	.381
Pair 11	Credibility question25 & experiment 2 credibility 6 - cq25	12	-.338	.282
Pair 12	Credibility question38 & experiment 2 credibility 7 - cq38	12	-.322	.308

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Usability question33 - experiment 2 usability 1 - uq33	-1.750	.754	.218	-2.229	-1.271	-8.042	11	.000
Pair 2	Usability question32 - experiment 2 usability 2 - uq32	-.667	1.371	.396	-1.538	.204	-1.685	11	.120
Pair 3	Usability question9 - experiment 2 usability 3 - uq9	-.583	1.240	.358	-1.371	.205	-1.629	11	.131

Pair 4	Usability question16 - experiment 2 usability 4 - uq16	-1.333	1.155	.333	-2.067	-.600	-4.000	11	.002
Pair 5	Usability question13 - experiment 2 usability 5 - uq13	-.750	1.658	.479	-1.804	.304	-1.567	11	.145
Pair 6	Credibility question39 - experiment 2 credibility 1 - cq39	-1.333	.778	.225	-1.828	-.839	-5.933	11	.000
Pair 7	Credibility question20 - experiment 2 credibility 2 - cq20	-.750	.965	.279	-1.363	-.137	-2.691	11	.021
Pair 8	Credibility question16 - experiment 2 credibility 3 - cq16	-1.500	.798	.230	-2.007	-.993	-6.514	11	.000
Pair 9	Credibility question15 - experiment 2 credibility 4 - cq15	-1.417	1.165	.336	-2.157	-.677	-4.214	11	.001
Pair 10	Credibility question23 - experiment 2 credibility 5 - cq23	-.833	1.193	.345	-1.592	-.075	-2.419	11	.034
Pair 11	Credibility question25 - experiment 2 credibility 6 - cq25	-1.333	1.303	.376	-2.161	-.506	-3.546	11	.005
Pair 12	Credibility question38 - experiment 2 credibility 7 - cq38	-1.083	1.165	.336	-1.823	-.343	-3.223	11	.008

Appendix 11a: Results of users' performance with the redesigned London Authority 1 in experiment 2

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	total time for all tasks	26.6267	12	8.90527	2.57073
	experiment 2 total time for all tasks	15.4267	12	2.49448	.72009
Pair 2	total steps for all tasks	60.4167	12	13.10419	3.78285
	experiment 2 total steps for all tasks	41.1667	12	4.64823	1.34183
Pair 3	total helps for all tasks	.2500	12	.45227	.13056
	experiment 2 total helps for all tasks	.0000	12	.00000	.00000
Pair 4	overall completion for all tasks	1.1389	12	.11725	.03385
	experiment 2 overall completion for all tasks	1.0000	12	.00000	.00000

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	total time for all tasks & experiment 2 total time for all tasks	12	-.035	.913
Pair 2	total steps for all tasks & experiment 2 total steps for all tasks	12	.063	.846
Pair 3	total helps for all tasks & experiment 2 total helps for all tasks	12	.	.
Pair 4	overall completion for all tasks & experiment 2 overall completion for all tasks	12	.	.

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	total time for all tasks - experiment 2 total time for all tasks	11.2000	9.3324	2.6940	5.2704	17.1295	4.157	11	.002
Pair 2	total steps for all tasks - experiment 2 total steps for all tasks	19.2500	13.625	3.9333	10.592	27.9073	4.894	11	.000

Pair 3	total helps for all tasks - experiment 2 total helps for all tasks	.25000	.45227	.13056	- .03736	.53736	1.915	11	.082
Pair 4	overall completion for all tasks - experiment 2 overall completion for all tasks	.13889	.11725	.03385	.06439	.21339	4.103	11	.002

Appendix 11b: Results of users' performance with the redesigned London Authority 2 in experiment 2

Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 total time for all tasks	21.7208	12	8.57907	2.47656
experiment 2 total time for all tasks	8.8033	12	1.79580	.51840
Pair 2 total steps for all tasks	81.8333	12	20.68743	5.97195
experiment 2 total steps for all tasks	40.9167	12	5.16031	1.48965
Pair 3 total helps for all tasks	.5833	12	.66856	.19300
experiment 2 total helps for all tasks	.0000	12	.00000	.00000
Pair 4 overall completion for all tasks	1.1481	12	.08650	.02497
experiment 2 overall completion for all tasks	1.0000	12	.00000	.00000

Paired Samples Correlations

	N	Correlation	Sig.
Pair 1 total time for all tasks & experiment 2 total time for all tasks	12	.337	.285
Pair 2 total steps for all tasks & experiment 2 total steps for all tasks	12	.140	.663
Pair 3 total helps for all tasks & experiment 2 total helps for all tasks	12	.	.
Pair 4 overall completion for all tasks & experiment 2 overall completion for all tasks	12	.	.

Paired Samples Test

	Mean	Paired Differences				t	df	Sig. (2-tailed)
		Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 total time for all tasks - experiment 2 total time for all tasks	12.91750	8.15198	2.35327	7.73798	18.09702	5.489	11	.000
Pair 2 total steps for all tasks - experiment 2 total steps for all tasks	40.91667	20.60652	5.94859	27.82391	54.00943	6.878	11	.000

Pair 3	total helps for all tasks - experiment 2 total helps for all tasks	.58333	.66856	.19300	.15855	1.00811	3.023	11	.012
Pair 4	overall completion for all tasks - experiment 2 overall completion for all tasks	.14815	.08650	.02497	.09319	.20311	5.933	11	.000

Appendix 11c: Results of users' performance with the redesigned London Authority 3 in experiment 2

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	total time for all tasks	16.2092	12	8.10166	2.33875
	experiment 2 total time for all tasks	10.0092	12	2.33404	.67378
Pair 2	total steps for all tasks	50.1667	12	16.29742	4.70466
	experiment 2 total steps for all tasks	40.3333	12	4.14144	1.19553
Pair 3	total helps for all tasks	.0000(a)	12	.00000	.00000
	experiment 2 total helps for all tasks	.0000(a)	12	.00000	.00000
Pair 4	overall completion for all tasks	1.0648	12	.08811	.02543
	experiment 2 overall completion for all tasks	1.0000	12	.00000	.00000

a The correlation and t cannot be computed because the standard error of the difference is 0.

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	total time for all tasks & experiment 2 total time for all tasks	12	-.037	.910
Pair 2	total steps for all tasks & experiment 2 total steps for all tasks	12	.041	.900
Pair 4	overall completion for all tasks & experiment 2 overall completion for all tasks	12	.	.

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	total time for all tasks - experiment 2 total time for all tasks	6.20000	8.51297	2.45748	.79112	11.60888	2.523	11	.028
Pair 2	total steps for all tasks - experiment 2 total steps for all tasks	9.83333	16.65060	4.80661	-.74595	20.41262	2.046	11	.065

Pair 4	overall completion for all tasks - experiment 2 overall completion for all tasks	.06481	.08811	.02543	.0088 3	.12080	2.548	11	.027
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Appendix 12 Performance measurement form

performance measurement form					
E-government name:					
Date:	T = time to complete each task			C = correct task completed	
	N = number of steps to finish each task			H = number of online help	
Task	T	N	H	C	NOTES
1	Start:				
	Finish:				
2	Start:				
	Finish:				
3	Start:				
	Finish:				
4	Start:				
	Finish:				
5	Start:				
	Finish:				
6	Start:				
	Finish:				
7	Start:				
	Finish:				
8	Start:				
	Finish:				
9	Start:				
	Finish:				
Total					

Appendix 13a: Results of data distribution in terms of users' perception and performance in experiment 1

One-Sample Kolmogorov-Smirnov Test (participants' responses)

	LA1 usability question responses	LA1 credibility question responses	LA2 usability question responses	LA2 credibility question responses	LA3 usability question responses	LA3 credibility question responses
N	50	39	50	39	50	39
Normal Parameters(a,b)	Mean 3.4448 Std. .41136 Deviation	3.6985 .32714	3.3238 .46002	3.4354 .36594	3.8428 .51348	3.8849 .61746
Most Extreme Differences	Absolute .116 Positive .075 Negative -.116	.113 .113 -.106	.145 .071 -.145	.101 .064 -.101	.140 .070 -.140	.165 .118 -.165
Kolmogorov-Smirnov Z	.820	.706	1.028	.631	.992	1.031
Asymp. Sig. (2-tailed)	.512	.701	.241	.820	.279	.238

a Test distribution is Normal.

b Calculated from data.

One-Sample Kolmogorov-Smirnov Test (participants' performance with London Authority 1)

	total time for all tasks	total steps for all tasks	total helps for all tasks	overall completion for all tasks
N	12	12	12	12
Normal Parameters(a,b)	Mean 26.6267 Std. 8.90527 Deviation	60.4167 13.10419	.2500 .45227	1.1389 .11725
Most Extreme Differences	Absolute .178 Positive .178 Negative -.122	.142 .142 -.118	.460 .460 -.290	.260 .260 -.156
Kolmogorov-Smirnov Z	.617	.493	1.593	.902
Asymp. Sig. (2-tailed)	.841	.968	.013	.390

a Test distribution is Normal.

b Calculated from data.

One-Sample Kolmogorov-Smirnov Test (participants' performance with London Authority 2)

	total time for all tasks	total steps for all tasks	total helps for all tasks	overall completion for all tasks
N	12	12	12	12
Normal Parameters(a,b)	Mean 21.7208 Std. 8.57907 Deviation	81.8333 20.68743	.5833 .66856	1.1481 .08650
Most Extreme Differences	Absolute .264 Positive .264 Negative -.144	.183 .183 -.170	.309 .309 -.233	.332 .332 -.251
Kolmogorov-Smirnov Z	.916	.633	1.069	1.151
Asymp. Sig. (2-tailed)	.371	.818	.203	.141

a Test distribution is Normal.

b Calculated from data.

One-Sample Kolmogorov-Smirnov Test (participants' performance with London Authority 3)

		total time for all tasks	total steps for all tasks	total helps for all tasks	overall completion for all tasks
N		12	12	12	12
Normal Parameters(a,b)	Mean	16.2092	50.1667	.0000	1.0648
	Std. Deviation	8.10166	16.29742	.00000c	.08811
Most Extreme Differences	Absolute	.150	.195		.352
	Positive	.150	.195		.352
	Negative	-.138	-.109		-.231
Kolmogorov-Smirnov Z		.521	.676		1.221
Asymp. Sig. (2-tailed)		.949	.750		.102

a Test distribution is Normal.

b Calculated from data.

c The distribution has no variance for this variable. One-Sample Kolmogorov-Smirnov Test cannot be performed.

Appendix 13b: Results of data distribution in terms of users' perception and performance in experiment 2

One-Sample Kolmogorov-Smirnov Test (participants' responses in London Authority 1 and the redesigned London Authority 1)

		Exp.1 Usability question40	Exp.1 Usability question33	Exp.1 Usability question41	Exp.1 Credibility question2	Exp.2 usability 1 (uq40)	Exp.2 usability 2 (uq33)
N		12	12	12	12	12	12
Normal Parameters(a,b) Most Extreme Differences	Mean	2.33	2.42	2.75	2.58	4.50	4.67
	Std. Deviation	1.155	1.084	.866	.996	.522	.651
	Absolute	.199	.316	.280	.245	.331	.446
	Positive	.199	.316	.220	.171	.331	.304
	Negative	-.136	-.184	-.280	-.245	-.331	-.446
Kolmogorov-Smirnov Z		.688	1.096	.971	.850	1.146	1.544
Asymp. Sig. (2-tailed)		.732	.181	.303	.465	.145	.017

a Test distribution is Normal.

b Calculated from data.

		Exp. 2 usability 3 (uq41)	Exp. 2 credibility 1 (cq2)
N		12	12
Normal Parameters(a,b) Most Extreme Differences	Mean	4.50	3.83
	Std. Deviation	.522	1.267
	Absolute	.331	.238
	Positive	.331	.179
	Negative	-.331	-.238
Kolmogorov-Smirnov Z		1.146	.825
Asymp. Sig. (2-tailed)		.145	.505

a Test distribution is Normal.

b Calculated from data.

One-Sample Kolmogorov-Smirnov Test (participants' responses in London Authority 2 and the redesigned London Authority 2)

		Exp.1 Usability question33	Exp.1 Usability question24	Exp.1 Usability question6	Exp.1 Usability question32	Exp.1 Usability question19	Exp.1 Credibility question2
N		12	12	12	12	12	12
Normal Parameters(a,b) Most Extreme Differences	Mean	2.25	2.17	2.33	2.50	2.67	2.67
	Std. Deviation	.866	1.030	.888	1.243	.778	.985
	Absolute	.280	.398	.230	.323	.304	.284
Extrem							

e	Positive	.280	.398	.230	.323	.304	.284
Differe	Negative	-.220	-.269	-.190	-.177	-.196	-.216
nces							
Kolmogorov-Smirnov		.971	1.377	.796	1.119	1.053	.984
Z							
Asymp. Sig. (2-tailed)		.303	.045	.551	.164	.217	.287

a Test distribution is Normal.

b Calculated from data.

		Exp.1 Credibilit y question2 4	Exp.1 Credibility question 39	Exp. 2 usability 1 (uq33)	Exp. 2 usability 2 (uq24)	Exp. 2 usability 3 (uq6)	Exp. 2 usability 4 (uq32)
N		12	12	12	12	12	12
Normal	Mean	2.83	2.92	4.00	3.92	4.33	3.92
Paramet							
ers(a,b)	Std. Deviation	.937	.515	.853	.793	.492	.793
Most	Absolute	.237	.398	.333	.209	.417	.375
Extrem							
e	Positive	.179	.352	.250	.209	.417	.291
Differe	Negative	-.237	-.398	-.333	-.209	-.249	-.375
nces							
Kolmogorov-Smirnov		.822	1.377	1.155	.726	1.446	1.300
Z							
Asymp. Sig. (2-tailed)		.509	.045	.139	.668	.031	.068

a Test distribution is Normal.

b Calculated from data.

		Exp. 2 usability 5 (uq19)	Exp. 2 credibility 1 (cq2)	Exp. 2 credibilit y 2 (cq24)	Exp. 2 credibility 3 (cq39)
N		12	12	12	12
Normal	Mean	4.25	4.17	4.58	4.50
Paramet					
ers(a,b)	Std. Deviation	.622	1.115	.515	.522
Most	Absolute	.323	.274	.374	.331
Extrem					
e	Positive	.323	.227	.288	.331
Differe	Negative	-.260	-.274	-.374	-.331
nces					
Kolmogorov-Smirnov		1.119	.949	1.296	1.146
Z					
Asymp. Sig. (2-tailed)		.164	.329	.070	.145

a Test distribution is Normal.

b Calculated from data.

One-Sample Kolmogorov-Smirnov Test (participants' responses in London Authority 3 the redesigned London Authority 3)

	Exp.1 Usability question3 3	Exp.1 Usability question 32	Exp.1 Usability question9	Exp.1 Usability question 16	Exp.1 Usability question1 3	Exp.1 Credibility question 39
N	12	12	12	12	12	12

Normal Parameters(a,b)	Mean	2.58	2.92	2.83	2.83	3.00	3.08
	Std. Deviation	.669	1.084	1.030	1.030	.853	.515
Most Extreme Differences	Absolute	.309	.303	.291	.291	.333	.398
	Positive	.309	.303	.291	.291	.333	.398
	Negative	-.233	-.199	-.209	-.209	-.250	-.352
Kolmogorov-Smirnov Z		1.069	1.049	1.007	1.007	1.155	1.377
Asymp. Sig. (2-tailed)		.203	.222	.262	.262	.139	.045

a Test distribution is Normal.

b Calculated from data.

		Exp.1 Credibility question2 0	Exp.1 Credibility question 16	Exp.1 Credibility question1 5	Exp.1 Credibility question 23	Exp.1 Credibility question2 5	Exp.1 Credibility question 38
N		12	12	12	12	12	12
Normal Parameters(a,b)	Mean	2.75	2.75	3.08	3.17	3.17	3.17
	Std. Deviation	.866	.754	.996	.937	1.030	.937
Most Extreme Differences	Absolute	.307	.257	.367	.237	.314	.237
	Positive	.307	.257	.367	.237	.314	.237
	Negative	-.193	-.213	-.217	-.179	-.186	-.179
Kolmogorov-Smirnov Z		1.063	.890	1.270	.822	1.089	.822
Asymp. Sig. (2-tailed)		.209	.407	.079	.509	.187	.509

a Test distribution is Normal.

b Calculated from data.

		Exp.2 usability 1 (uq33)	Exp.2 usability 2 (uq32)	Exp.2 usability 3 (uq9)	Exp.2 usability 4 (uq16)	Exp.2 usability 5 (uq13)	Exp.2 credibility 1 (cq39)
N		12	12	12	12	12	12
Normal Parameters(a,b)	Mean	4.33	3.58	3.42	4.17	3.75	4.42
	Std. Deviation	.492	1.165	.900	.577	1.215	.515
Most Extreme Differences	Absolute	.417	.306	.408	.364	.248	.374
	Positive	.417	.194	.259	.364	.175	.374
	Negative	-.249	-.306	-.408	-.303	-.248	-.288
Kolmogorov-Smirnov Z		1.446	1.061	1.414	1.259	.860	1.296
Asymp. Sig. (2-tailed)		.031	.210	.037	.084	.451	.070

a Test distribution is Normal.

b Calculated from data.

		Exp.2 credibility 2 (cq20)	Exp.2 credibility 3 (cq16)	Exp.2 credibility 4 (cq15)	Exp.2 credibility 5 (cq23)	Exp.2 credibility 6 (cq25)	Exp.2 credibility 7 (cq38)
N		12	12	12	12	12	12

Normal Parameters(a,b)	Mean	3.50	4.25	4.50	4.00	4.50	4.25
	Std. Deviation	1.000	.452	.522	1.044	.522	.452
Most Extreme Differences	Absolute Positive	.358	.460	.331	.333	.331	.460
	Negative	.225	.460	.331	.169	.331	.460
		-.358	-.290	-.331	-.333	-.331	-.290
Kolmogorov-Smirnov Z		1.241	1.593	1.146	1.155	1.146	1.593
Asymp. Sig. (2-tailed)		.092	.013	.145	.139	.145	.013

a Test distribution is Normal.

b Calculated from data.

One-Sample Kolmogorov-Smirnov Test (participants' performance with London Authority 1 the redesigned London Authority 1)

		Exp.1 total time for all tasks	Exp.1 total steps for all tasks	Exp.1 total helps for all tasks	Exp.1 overall completion for all tasks
N		12	12	12	12
Normal Parameters(a,b)	Mean	26.6267	60.4167	.2500	1.1389
	Std. Deviation	8.90527	13.10419	.45227	.11725
Most Extreme Differences	Absolute Positive	.178	.142	.460	.260
	Negative	.178	.142	.460	.260
		-.122	-.118	-.290	-.156
Kolmogorov-Smirnov Z		.617	.493	1.593	.902
Asymp. Sig. (2-tailed)		.841	.968	.013	.390

a Test distribution is Normal.

b Calculated from data.

		Exp.2 total time for all tasks	Exp.2 total steps for all tasks	Exp.2 total helps for all tasks	Exp.2 overall completion for all tasks
N		12	12	12	12
Normal Parameters(a,b)	Mean	15.4267	41.1667	.0000	1.0000
	Std. Deviation	2.49448	4.64823	.00000c	.00000c
Most Extreme Differences	Absolute Positive	.136	.182		
	Negative	.136	.182		
		-.135	-.102		
Kolmogorov-Smirnov Z		.471	.632		
Asymp. Sig. (2-tailed)		.980	.819		

a Test distribution is Normal.

b Calculated from data.

c The distribution has no variance for this variable. One-Sample Kolmogorov-Smirnov Test cannot be performed.

One-Sample Kolmogorov-Smirnov Test (participants' performance with London Authority 2 the redesigned London Authority 2)

		Exp.1 total time for all tasks	Exp.1 total steps for all tasks	Exp.1 total helps for all tasks	Exp.1 overall completion for all tasks
N		12	12	12	12
Normal Parameters(a,b)	Mean	21.7208	81.8333	.5833	1.1481

	Std. Deviation	8.57907	20.68743	.66856	.08650
Most Extreme Differences	Absolute Positive	.264	.183	.309	.332
	Negative	-.144	-.170	-.233	-.251
Kolmogorov-Smirnov Z		.916	.633	1.069	1.151
Asymp. Sig. (2-tailed)		.371	.818	.203	.141

a Test distribution is Normal.

b Calculated from data.

		Exp.2 total time for all tasks	Exp.2 total steps for all tasks	Exp.2 total helps for all tasks	Exp.2 overall completion for all tasks
N		12	12	12	12
Normal Parameters(a,b)	Mean	8.8033	40.9167	.0000	1.0000
	Std. Deviation	1.79580	5.16031	.00000c	.00000c
Most Extreme Differences	Absolute Positive	.261	.119		
	Negative	-.116	-.119		
Kolmogorov-Smirnov Z		.905	.412		
Asymp. Sig. (2-tailed)		.386	.996		

a Test distribution is Normal.

b Calculated from data.

C The distribution has no variance for this variable. One-Sample Kolmogorov-Smirnov Test cannot be performed.

One-Sample Kolmogorov-Smirnov Test (participants' performance with London Authority 3 the redesigned London Authority 3)

		Exp.1 total time for all tasks	Exp.1 total steps for all tasks	Exp.1 total helps for all tasks	Exp.1 overall completion for all tasks
N		12	12	12	12
Normal Parameters(a,b)	Mean	16.2092	50.1667	.0000	1.0648
	Std. Deviation	8.10166	16.29742	.00000c	.08811
Most Extreme Differences	Absolute Positive	.150	.195		.352
	Negative	-.138	-.109		-.231
Kolmogorov-Smirnov Z		.521	.676		1.221
Asymp. Sig. (2-tailed)		.949	.750		.102

a Test distribution is Normal.

b Calculated from data.

C The distribution has no variance for this variable. One-Sample Kolmogorov-Smirnov Test cannot be performed.

		Exp.2 total time for all tasks	Exp.2 total steps for all tasks	Exp.2 total helps for all tasks	Exp.2 overall completion for all tasks
N		12	12	12	12
Normal Parameters(a,b)	Mean	10.0092	40.3333	.0000	1.0000
	Std. Deviation	2.33404	4.14144	.00000c	.00000c
Most Extreme Differences	Absolute Positive	.134	.213		
	Negative	-.125	-.164		
Kolmogorov-Smirnov Z		.463	.739		
Asymp. Sig. (2-tailed)		.983	.645		

- a Test distribution is Normal.
- b Calculated from data.
- C The distribution has no variance for this variable. One-Sample Kolmogorov-Smirnov Test cannot be performed

Appendix 14 Overall users' perception of usability and credibility difference in the three London Authorities in experiment 1

ANOVA (usability and credibility comparison in London Authorities 1, 2, 3)

		Sum of Squares	df	Mean Square	F	Sig.
overall	Between Groups	1.775	2	.888	8.784	.001
usability	Within Groups	3.335	33	.101		
perception	Total	5.111	35			
overall	Between Groups	1.220	2	.610	4.885	.014
credibility	Within Groups	4.120	33	.125		
perception	Total	5.340	35			

Appendix 15 Users' performance difference in the three London Authorities in experiment 1

ANOVA (performance comparison in London Authorities 1, 2, 3)

		Sum of Squares	df	Mean Square	F	Sig.
total time for all tasks	Between Groups	651.880	2	325.940	4.474	.019
	Within Groups	2403.953	33	72.847		
	Total	3055.833	35			
total steps for all tasks	Between Groups	6266.056	2	3133.028	10.862	.000
	Within Groups	9518.250	33	288.432		
	Total	15784.306	35			
total online helps for all tasks	Between Groups	2.056	2	1.028	4.733	.016
	Within Groups	7.167	33	.217		
	Total	9.222	35			
Successful tasks completion	Between Groups	.050	2	.025	2.590	.090
	Within Groups	.319	33	.010		
	Total	.369	35			

Appendix 16 Ethics approval letter

School of Information Systems, Computing and Mathematics

K Darby-Dowman, Head of School, Professor of Operations Research

G Fitzgerald Head of IS&C, Professor of Information Systems

J Kaplunov, Head of Mathematical Science, Professor of Applied Mathematics



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Date: **25.09.2008**

STATEMENT OF ETHICS APPROVAL

Proposer: Zhao Huang

Title: Evaluation of usability and credibility of Web-based e-governments

The school's research ethics committee has considered the proposal recently submitted by you. Acting under delegated authority, the committee is satisfied that there is no objection on ethical grounds to the proposed study. Approval is given on the understanding that you will adhere to the terms agreed with participants and to inform the committee of any change of plans in relations to the information provided in the application form.

Yours sincerely,

A handwritten signature in blue ink that reads "A. M. Payne".

**Dr. Annette Payne Chair of the Research Ethics Committee
SISCM**