

PERSPECTIVE

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Impact upfront: novel format for Novo Nordisk Foundation funding

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Abstract

Many retrospective assessments of the wider, societal impacts from health research funding use the Payback Framework or other frameworks. Much of this experience was collated in the 2018 Statement by the International School on Research Impact Assessment (ISRIA). Despite increased interest, especially in engaged research and a wider range of evaluation approaches, rarely do health and other research funders take a prospective approach and analyse the potential impact from a proposal to inform an impact management approach aimed at boosting impact. In this paper, experts from the Novo Nordisk Foundation, a leading philanthropic funder of research, describe how they are developing and applying such a pioneering approach. The five steps form a continuum from project inception to data collation and assessment. The first step entails preparing the project's narrative in alignment with the project's vision. The second, building the logic model, includes defining success factors and effect chains. The third is an early assessment of the initiative's potential impact, conducted on a case basis. The fourth is implementing the data model by integrating specific indicators. The fifth focuses on monitoring, impact management and creating impact products, including developing a comprehensive plan for data reporting and assessment, with scope for adjustments based on experience. This approach aligns with ISRIA guidelines, but further steps are needed. Whilst the Foundation is driving innovation in impact assessment by successfully introducing a new approach that uses prospective impact analysis to inform impact management to enhance the levels of impact achieved, further progress is needed on stakeholder engagement expanding towards a more inclusive stakeholder involvement.

Keywords Intervention logic, Impact management, Theory-of-change, Impact framework, Novo Nordisk Foundation, Payback Framework, Prospective assessment, Research funders, Research impact, Societal benefits

Background

"An examination of how researchers and research managers can at an early stage focus their attention on.... prospectively identifying how and where payback could be expected to occur from a proposed project in order to help maximize the payback" (Buxton & Hanney, 1996, p. 41 [1]).

This call to maximize the wider societal impacts from projects, by prospectively examining how such payback might arise, was made at the end of the article presenting a pioneering approach developed primarily to retrospectively assess the benefits from completed health research. This approach went beyond just measuring traditional academic impacts [1]. This approach, the Payback Framework, was developed in the United Kingdom in the mid-1990s with a multidimensional categorization of benefits and a (logic) model to help organize the assessment of impacts. The Payback Framework was developed deliberately to reflect the context of increasing recognition in the 1980s and 1990s by the research division of the UK's health department that impact would be more likely to

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occur when there was collaboration between researchers and potential users in setting research agendas [1].

Therefore, whilst the framework did incorporate linear aspects in terms of considering inputs and outputs so as to assess the impact of research, overall, it was designed to capture the various ways in which impact might arise. This was seen as being especially through “bidirectional interactions between researchers and users at all stages... from agenda setting to dissemination and implementation” [2, p. 4].

Subsequently, reviews give details of an increasing number of other approaches being developed and applied for assessing the wider societal impacts of health research [2–6], as well as for research in general [7]. Nevertheless, these reviews suggest that the Payback Framework, with its application to the research of diverse funders, has internationally been the most widely used approach following more than 25 years of further development, adaptation and application to assess one or more of the various societal impacts from completed research [1, 8–28]. Crucially, for this paper, however, overwhelmingly these applications of the Payback Framework, and as far as we are aware, other studies in the reviews, were primarily retrospective assessments of the impact achieved. Much less progress has been made with prospectively identifying potential impact to maximize the payback from a project.

This current paper discusses a major initiative to address prospective identification of potential impact by the Danish Novo Nordisk Foundation (NNF) that has integrated a prospective impact assessment approach, partly informed by the Payback Framework, into the management of its annual funding portfolio.

Before describing NNF’s major programme to advance the field by developing and applying a detailed prospective approach that continues up to 5 years after the active grant period, we discuss some aspects of the context that might be particularly relevant. Abudu and colleagues noted there is growing interest in advancing the field of how organizations assess the impact of the health research that they fund [29].

Lessons from the International School for Research Impact Assessment (ISRIA) statement

When considering how research funding organizations might assess the impact of the research they fund, Abudu and colleagues, along with other recent analyses, draw on the 2018 statement by ISRIA [30]. The ISRIA statement collated much of the thinking on the topic of assessing the impact from research. Whilst it did so primarily from the perspective of the experience of retrospective assessments, it is so comprehensive that it is useful to consider the lessons that can be drawn from it that might also

be relevant for prospective analysis of research impact. This Statement was produced by leading members of the International School who had been collaborating in various combinations during the School’s 5-year run from 2013 to 2017. Amongst the many key contributors to the statement were experts from the Agency for Health Quality and Assessment of Catalonia; Alberta Innovates; RAND Europe/The Policy Unit, King’s College London; and NNF.

The 10-point ISRIA guide for effective research impact assessment (RIA) (see Fig. 1) identified and organized key points from the growing literature and drew on the experience of more than 450 participants in the School’s activities from 34 countries [30].

Here we selectively identify the lessons for organizations undertaking RIA provided by 5 of the 10 guidelines or recommendations, which the guide did not explicitly state were intended to be applicable only to retrospective impact assessment. The statement’s first recommendation, headed “Context”, highlights the importance of understanding why the particular research is conducted and “how it is relevant to the needs of potential research users” [30, p. 6].

The second recommendation, “Purpose”, tells research impact assessors to “reflect continuously on your purposes”. For this it highlights the 4 As of RIA first stated by Morgan Jones and Grant, which are: Accountability, Advocacy, Allocation and Analysis [31]. The latter was defined as: “understanding how science works and how to shape it”. Analysis as a purpose for conducting research impact assessment raises an important consideration that has a somewhat different focus from the other three because they are all concerned with research funding in one way or another. The ISRIA statement notes that Analysis is aimed at understanding how science works to optimize returns. The example given relates to the more usual way of doing this, which is through providing lessons to increase the returns on future research, rather than strengthening the management of ongoing projects, as is the case with NNF.

The third recommendation, on “Stakeholders’ Needs”, links to the first, and suggests different stakeholders play different roles in the research process and therefore value different aspects of RIA. According to the statement, depending on their role in the research process, “stakeholders can be classified into research funders, research participants, researchers, research users and research beneficiaries” [30 p. 8].

In recommendation 5, “Conceptual frameworks”, the statement recommends their use, and notes there are various ones from which to choose. Although it does not advocate for the use of any specific framework, it states, as an example, that “the Payback Framework has been

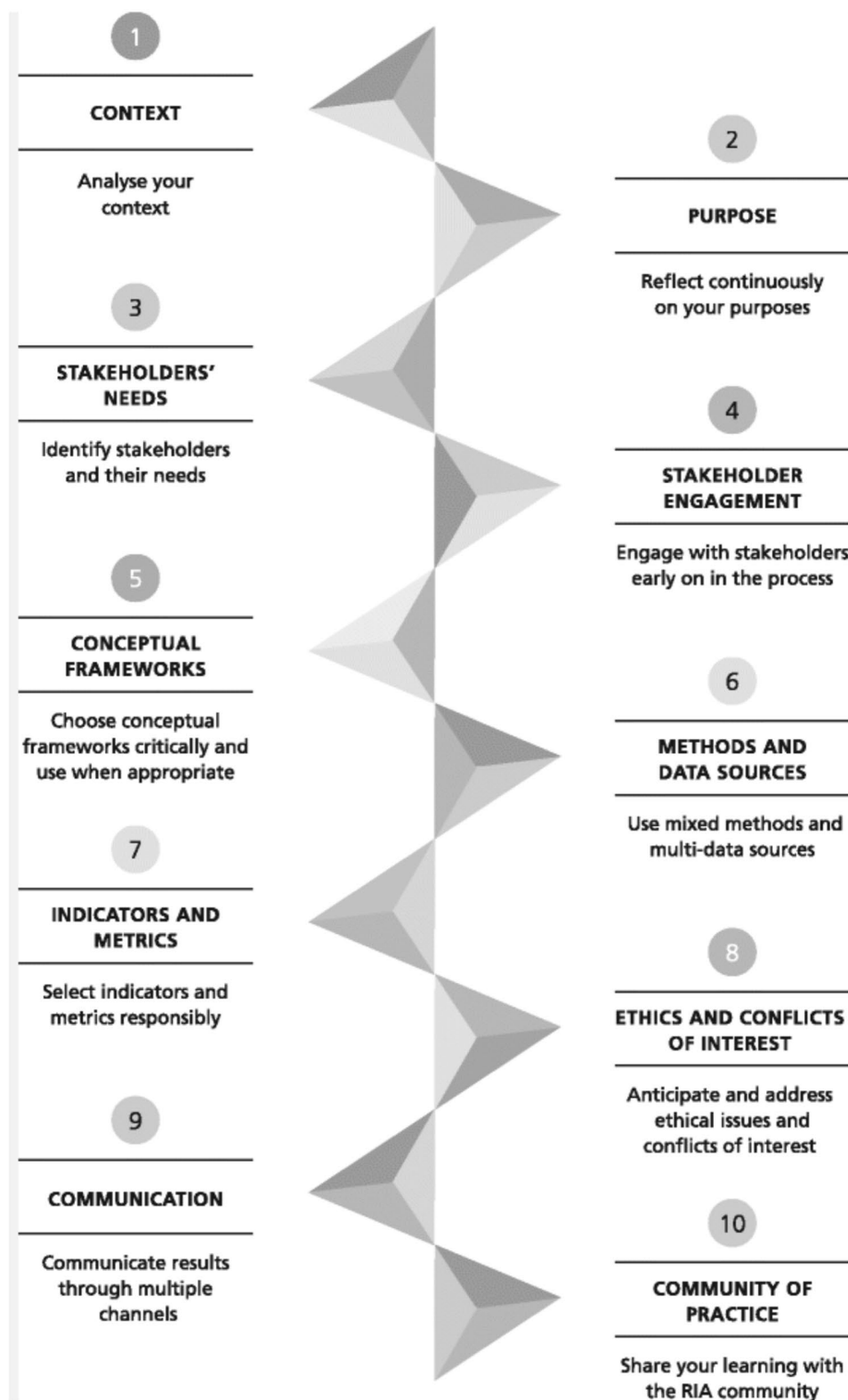


Fig. 1 ISRIA statement: 10-point guidelines for an effective process of research impact assessment. Source: Adam, P., et al. (2018) ISRIA statement: ten-point guidelines for an effective process of research impact assessment, *Health Res Policy Sys*, 16:8. <https://doi.org/10.1186/s12961-018-0281-5>

widely used for an understanding of the research process and pathways to impact in the United Kingdom and many other countries” [30, p. 9].

According to the statement’s seventh recommendation, for “Indicators and Metrics”, good practice is to “select indicators and metrics responsibly”. This was illustrated using the work of Graham and colleagues in Alberta to integrate measurements into the province’s main research-funder’s impact assessments using the Canadian Academy of Health Science’s framework that was based on the Payback Framework [32].

Examples of how previous RIAs facilitated (prospective) analysis and the role of engaged research

Some of the many examples of RIA have gone beyond just the key Accountability and Advocacy purposes of demonstrating the wider impacts made by the research funded by public bodies or charities. Commenting on applications of the Payback Framework, a senior official involved in UK public funding of health research emphasized how originally it had been developed collaboratively with officials in the Department of Health’s R&D Division and: “studies have applied the framework to provide funders and policy-makers with evidence that will help them optimize the outcomes from their funding” [33].

This means there has been some progress with using RIAs for the purpose of Analysis to inform the strategies of research funders in ways that might increase future impact. This was seen in the approach used in the evaluations of the research funded by various medical research charities. In the application of the Payback Framework in the United Kingdom to assess the impact of research funded by the Arthritis Research Campaign (now Versus Arthritis), in addition to highlighting the benefits resulting from the funding, the evaluation analysed how the impact had been achieved with the aim of “identifying opportunities for development” [11, p. 1145]. Similarly, the Payback evaluations conducted for Asthma UK [20], as well as for the National Breast Cancer Foundation in Australia [21], aimed to provide useful lessons on how the organizations could enhance the impact from their research-funding, in addition to demonstrating the valuable impacts resulting from the funding.

These examples of using RIA for the goal of Analysis would be likely to enhance future levels of research impact through identifying and promoting more effective research funding strategies and other processes. They were not, however, primarily attempts to implement the quote at the start of this article – that would have involved taking a prospective approach when developing projects to identify the potential impact and focus on how to maximize such impact. Nevertheless, teams have continued to promote the desirability of adopting

this approach. For example, in identifying lessons from an application of the Payback Framework to assess the impact of cardiovascular and stroke research funded by Australian, Canadian and UK organizations, Wooding and colleagues concluded that research funders: “should encourage researchers to consider pathways towards impact” [22].

There has, however, been a relative paucity of evidence about such an active approach by funders, going as far as involving joint efforts with researchers to conduct a thorough prospective assessment of health research impact. The many challenges identified with conducting retrospective assessments of research impact [29], including around attribution and resource requirements [4], are likely to be magnified in any meaningful prospective approach where the findings of the research are unknown at the time of analysis.

Things might, however, be changing. A major recent paper brings together leaders from various research funding organizations that are attempting to engage researcher users in a range of processes such as agenda-setting across a range of fields [34]. The funders, whose approaches towards “engaged research” are described in the paper, include the Pew Foundation, which specializes in sustainability; The William T. Grant Foundation (education); and Health Research British Columbia. Reflecting on the approaches being developed, the funders suggest that more empirical studies are required of “whether, how, and why these engaged research methodologies contribute to improved societal outcomes” [34, p. 2]. In highlighting that change is underway, they identify the research and approach of several funders, one of which is NNF.

In publications from the sustainability field about promoting engaged research, one key point that emerges, as it had done with the original thinking around the Payback Framework, is around the feasibility of prospective analysis of impact. One section of the *Pew Marine Fellows Workshop Handbook* describes how to create an impact pathway that maps out a plan for achieving the anticipated impacts from a research project in marine conservation [35]. A research program on estuaries started with the research calls putting increased emphasis on researchers collaborating with potential users. The foundation then realized that additional steps would be necessary to make such collaboration effective. These additional steps included measures such as ensuring the process for reviewing proposals considered whether the intended outcomes were relevant to, and aligned with, user needs [36]. The William T. Grant Foundation supplements its research to improve young lives with a programme of research to improve the use of research evidence. They claim that there is an “extensive body of

knowledge” about evidence use, but there is still a need for evidence to be created that will identify validated strategies for creating the infrastructure for cultivating research use [37].

In a pioneering study, Kogan and Henkel [38] conducted a 7-year prospective evaluation of an early attempt to develop a system of engaged research in the health department of the United Kingdom [39]. The evaluation identified various challenges in implementing the new system. A key conclusion, however, was the importance of the researchers and the potential users working together to set the agenda for research that would better meet the needs of the healthcare system and hence be more likely to produce findings that might be adopted. The creators of the Payback Framework later worked with Kogan and Henkel to incorporate this analysis of the collaborative approach into the framework’s model for organizing the assessment of the impact from health research [1, 2]. This means that RIAs using the Payback Framework are encouraged to explore how far any collaboration over agenda-setting, research processes and dissemination seems to have been a factor in increasing impact. For example, the Framework facilitates analysis of “bidirectional interaction” [2] as noted above.

A comprehensive review of frameworks for RIA developed a categorization of approaches to assessing research impact [40]. According to that, the Payback Framework is seen as offering more than an “unenanced logic model” because it incorporates some elements of “interpretative and interactional models”, with a variety of methods such as interviews being applied as appropriate [40]. The review claims that when conducting RIA, there are many advantages in using a logic model, especially along with interactive approaches. Nevertheless, the review also identifies various limitations associated with using logic models. Furthermore, advocates of realist evaluation, for example, claim that it would provide a more suitable way to evaluate complex interventions. It appeared, however, at least in the 2016 review, that examples of such an approach being used in RIA were “sparse” [40; p. 55]. Other evaluation approaches, such as Blue Marble Evaluation, are sometimes seen as providing an adaptive approach for evaluating major system change initiatives that might be better able to consider the inevitable uncertainties than approaches involving logic models [41]. Again, however, despite their use in evaluation more widely, we are not aware of much evidence about their application specifically in the assessment of the impact of research projects or programmes.

The RIA review also notes that many of the included models draw on multiple assumptions, and that it was therefore worth introducing pragmatism, “a composite philosophical position” [40; p. 49]. Drawing on the work

of Dewey [42], the review claims: “Ontologically and epistemologically eclectic pragmatism proposes that when combining scientific and practical knowledge (e.g. when attempting to link a body of research with its application in the real world), the relevance of each competing position should be judged in terms of how well it addresses the problematic situation or issue at hand” [40; p. 49].

There is one further perhaps parallel area that could possibly inform attempts to develop a prospective approach to assessing the impact from specific health research projects. This relates to the use of ex ante RIAs to inform research prioritization. There are some claims that it has been technically possible to make some progress using value of information analysis [43]. Some reviews of impact assessment have included studies such as these [44]. However, neither these studies on topic prioritization, nor ones that might also be conducted to inform funding decisions about specific research projects [45], seem, in practice, to have been continued into the actual management of research projects or programmes, although there had been some hopes that this might be feasible.

NNF: a major research funder

Overall, whilst there is clearly increased interest from various research funders in engaged research and prospective impact assessment, as far as we know, NNF is breaking new ground with its work to adopt systematic prospective impact assessment as part of an impact management approach for each funded proposal. NNF is a Danish enterprise foundation. The Foundation has the following two objectives: to provide a stable basis for the commercial and research activities of the companies in the Novo Group (Novo Nordisk A/S and Novonesis A/S), and to philanthropically support scientific, humanitarian and social causes [46, 47]. In this second role it is dedicated to supporting a broad spectrum of medical research and innovation, including physiological, endocrinological and metabolic studies, as well as research hospital initiatives focussed on diabetes in Denmark, and other scientific as well as humanitarian and social purposes. As it stands today, the Foundation is the result of exponential organizational growth and development with a ramp up of its grant-awarding over the past 15–20 years. In 2023, NNF awarded €1.22 billion for philanthropic grants and investments, where more than €900 million was grants for scientific purposes, placing it amongst the three largest private foundations in the world [48]. In recent years, NNF has developed, co-developed and awarded funding for more than 100 initiatives every year, from small standalone grants to open competition programmes and multiple €1–300 million research centres. [46–48]

The Foundation has participated actively in, and contributed to, the international communities of RIA, for example, by hosting the 2017 ISRIA event [30], and lately in the creation of the Research on Research Institute (RoRI) as an active partner both in governance bodies and in research projects. Through these activities, and several strategic as well as practical collaborations between international funders, NNF has played a leading role in the international movement to promote (and conduct) analysis of how best to assess and enhance the nonacademic impact of research. As one source for their 2020 article on how research funders conduct RIA, Kamenetzky and Hinrichs-Krapels collected evidence from selected organizations at the forefront of RIA, including NNF, at the 2017 ISRIA [49]. In general, they reported that despite all the examples of RIA and many frameworks, there was only limited evidence about the details of organizational practices used by research funding bodies in relation to such assessments. Nevertheless, they did refer to attempts by funding organizations included in their interviews to encourage researchers to plan for impact. Our current paper focusses on NNF's latest work in this field, mainly conducted since 2021.

The novel work of the Novo Nordisk Foundation to bring impact upfront

As a private organization, the NNF answers to its Board of Directors and has wide opportunities to pursue long-term goals. The vision set out in NNF's current strategy "is to improve people's health and the sustainability of society and the planet" [50]. The strategy runs to 2030 and addresses selected global grand challenges within health, sustainability and the life-science ecosystem that underpins the solving of grand challenges within health and sustainability. A mission has furthermore been identified for each of the focus areas, for example, "advance knowledge and solutions to support the green transition in society" for the sustainability area.

Grand challenges are *grand* due to their complexity and scale. Grand challenges can be viewed as open-ended missions, concerning the socioeconomic system as a whole and requiring system transformation [51]. These may take decades to solve, and none of the projects funded by the Foundation are expected to solve these challenges single-handedly, but by clearly defining three focus areas in the strategy, each of which have further defined four underlying themes (e.g. "sustainable food for healthy diets" within sustainability [50]), and linking all projects to these, the hope is the Foundation will live to see challenges solved and will be able to monitor progress and address needs. This mission approach to funding makes it possible to attempt to identify how each initiative supports societal impact – even beyond the

expectations of the individual project. This requires a signature approach to working with impact both within the Foundation and with stakeholders involved in the application, and to deliver and communicate about progress toward societal impact. To meet these needs the Foundation has introduced *impact management* as an overarching management concept. Impact management provides a unified understanding of how to identify success and potential impact in and beyond prospective projects, stressing the importance of evaluation for learning and future improvement, and delivers a versatile data environment that serves the NNF board of directors as well as its employees, grantees and their institutions.

Impact management encompasses all processes and deliverables essential for gathering data, monitoring progress, facilitating evidence-informed management and evaluating milestone achievement and success across all stages and beyond the grant life cycle. An integral component within impact management involves the utilization of impact frameworks, which encompass the design of instruments or programmes and the validation of project success through the application of a logic model approach.

The Payback Framework has been widely used *ex post* to evaluate impact, and *a priori* use of programme theory (or theory of change) is not novel in intervention design (even if used only fragmentally [52]). However, systematic implementation of these approaches in the research management space by a funder is novel, as far as we are aware. In the NNF the approach revolves around the use of *impact frameworks*, which build on a common practice of illustrating the theory of change in a logic model.

Building the Novo Nordisk Foundation approach

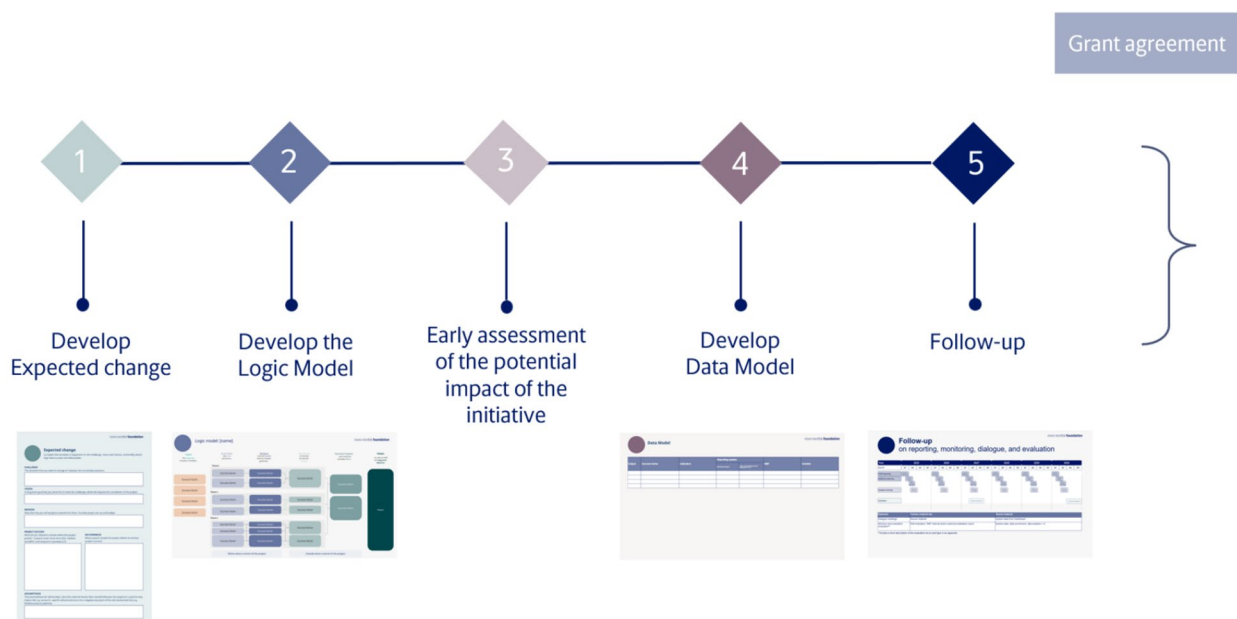
The NNF impact framework ensures pre-grant alignment of expectations for all standalone grants greater than €2 million, first and foremost, between the applicant on one side and the NNF as well as co-funders on the other side. Thus, the impact framework is a co-creation process between the applicant, the NNF Project Lead and an Impact Partner from the Impact Management team (the impact framework facilitator) to ensure active engagement and co-ownership. The Foundation widely interacts with potential "research users and research beneficiaries", to use the phrase for societal stakeholders from the ISRIA Statement [30]. Societal stakeholders, such as patient organizations, humanitarian organization or municipalities, can play an active role in the creation of impact frameworks, ensuring first-hand representation of societal needs when invited by the applicant. An example is the project "Best for Us" [53] from 2024, funded by the NNF, the Obel Family Foundation and the Lundbeck Foundation. It is an interdisciplinary research-informed

project aimed at ensuring better and faster treatment for children and young people experiencing mental health challenges. The Danish Mental Health Fund (Psykiatrifonden), a nongovernmental organization (NGO) dedicated to improving mental health and providing support for individuals with psychiatric conditions, was included in the workshops to create the impact framework.

The increasing NNF focus on engagement between researchers and societal stakeholders can manifest directly through initiatives such as the joint open competition call “Transdisciplinary approaches to mobility and global health” from 2023, established in collaboration with Wellcome Trust and Volkswagen Foundation. This requires funding proposals to respond to the request that “a significant part of the research must [...] and include close collaboration with local communities, stakeholders, and other relevant actors” [54]. Additionally, in implementing impact frameworks for standalone grants, NNF can champion societal stakeholders by actively representing their interests and perspectives, even if these stakeholders are not directly involved in the creation of the framework. By doing so, NNF has an eye for bridging the gap between societal stakeholders and decision-making processes, advocating for their concerns and priorities to be integrated into the framework. This commitment to inclusivity and representation highlights NNF’s dedication to fostering positive societal impact through its projects and decisions.

The impact framework process can be broken down into five process steps as shown in Fig. 2, which presents the procedural continuum, spanning from project inception to the plan for data reporting and assessment. The first four impact framework process steps take place before the funding decision is taken and the fifth takes place before the grant agreement is signed.

- Preparation for the logic model: Establishing preliminary requisites necessary for developing the logic model, ensuring alignment with the overarching vision of the project.
- Building the logic model: Developing the logic model, including defining success factors and causal effect chains to track progress and outcomes.
- Early assessment of the potential impact of the initiative: Conducting input–output analysis and early assessment of the initiative’s potential impact, ranging from simple, practical assessments to full-scale cost–benefit evaluations.
- Implementation of the data collection model: Integrating specific indicators into a data model, sourcing data from designated repositories to support the logic model.
- Monitoring, impact management and impact products: Developing a comprehensive plan for data reporting and assessment.



The process steps of the impact framework are integrated into a screening and development pipeline stage gate model to guide the development and execution of various standalone proposals. Some key features of the overall stage gate model are outlined below before each of the five impact framework steps is described in more detail. The stage gate approach ensures that proposals are systematically reviewed and evaluated at key stages, facilitating informed decision-making, and divided into distinct stages for ideation/exploration, design, application review, and implementation, each marked by a gate where progress towards funding decision is assessed before moving forward.

The motivation behind the Novo Nordisk Foundation stage gate model is to ensure that all new ideas for standalone projects are rigorously evaluated and endorsed by key executives and the portfolio board. Before entering the pipeline and before applicants are officially invited to develop projects, all projects undergo an Initial Screening Dialogue. Most projects that are discontinued are discontinued at this stage, where only internal NNF employees have been involved. Subsequently, the projects are further developed and assessed through three further gates in the stage gate model, where the Portfolio Board assess projects throughout their development and how they support the Foundation's strategy.

After passing through the second gate the applicants are formally invited to write their full application. Most projects discontinued within the development pipeline are terminated at an early stage, within the ideation/exploration and design stages, before writing the full application, thereby alleviating the frustration associated with investing time in projects that do not secure funding. In general, the experience is that applicants perceive this as a necessary condition for entering an application process.

As research and other experimental approaches inherently carry uncertainties about the outcomes, once they have been funded, approved standalone projects with an impact framework can then be revised on the basis of the learnings and insights gained during the grant period. This may involve adjustments to success factors as well as indicators.

Impact framework process step 1: Preparation for the logic model

The preparation process step is a co-creation between the applicant and the Project Lead from the Programme Area in the NNF. This stage emphasizes the long cycle narrative, encompassing contemplation on the intended transformative impact of the grant and the overarching vision it embodies. This long cycle approach is unfolded in the template, shown in Fig. 3, covering the following

main perspectives: (1) the applicant delineates what challenge they face, the vision they are reaching for, the set-up to take them there and identifies what success looks like, progressing towards the vision spanning the short-, medium- and long-term perspectives; (2) on the basis of the specific type of grant instrument, the applicant articulates the actions and direct results essential for realizing these objectives; and (3) furthermore, to comprehend the underlying rationale of the long-term approach, an examination of implicit assumptions on external elements potentially influencing the probability of success is required. This covers considerations about dependencies on project external factors (e.g. human behavioural response, collaboration, access to infrastructure, etc.). Assumptions may also cover partners that are not directly involved in the impact framework process.

This strategic thinking approach often introduces a novel perspective for many of the Foundation's applicants. Observation indicates that engaging with the overall narrative cultivates a mindset that primes the applicant to actively participate in a co-creation process of the logic model. The Project Lead from the programme area in the NNF facilitates this preparatory stage, fostering a dialogue with the applicant and potential invited societal stakeholders. This intentional separation ensures that initial reflections are based on key partner input. The Impact Management team is sometimes invited for workshop facilitation but is careful not to influence the project's substantive content. The Expected Change must be approved by the programme area and the Impact Management team prior to working with the logic model.


This preparatory step serves a dual purpose: firstly, it ensures the project's and stakeholder's readiness to progress further in the process, and secondly, the reflections feed into the subsequent process step – a workshop on the logic model facilitated by the Impact Management team.

Impact framework process step 2: Building the logic model

Building the logic model is a co-creation between the applicant side, the Project Lead from the Programme Area in NNF and the Impact Partner. Where the preparatory phase was focussed on the long-cycle narrative scope, the logic model deconstructs this narrative into concise short-cycle success factors within the categories of input, activity, output, outcome and impact. Using the logic model template as shown in Fig. 4 establishes success factors and constructs impact pathways by establishing effect-chains between these success factors, spanning from the initial input to the vision of the project.

The co-creation of the logic model takes place through physical or online workshop settings, later transitioning

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Expected change

Complete this template to alignment on the challenge, vision and mission, and briefly sketch high-level success and deliverables.

CHALLENGE

The situation that you want to change or improve. Do not include solutions.

VISION

A long-term goal that you strive for to meet the challenge, which lies beyond the completion of the project.

MISSION

Describe how you will progress towards the Vision. Include project set-up and budget.

PROJECT SUCCESS

What do you intend to achieve within the project period + 5 years? Cover short term (ST), medium term(MT), and long term outcomes (LT)

DELIVERABLES

What outputs should the project deliver to achieve project success?

ASSUMPTIONS

The preconditions for deliverables. Describe external factors that can/will influence the project in a positive way (inputs like e.g. access to specific infrastructures) or in a negative way (part of the risk assessment like e.g. limited access to patients)

Fig. 3 Preparation for the logic model. Source: Novo Nordisk Foundation/ Impact Management team

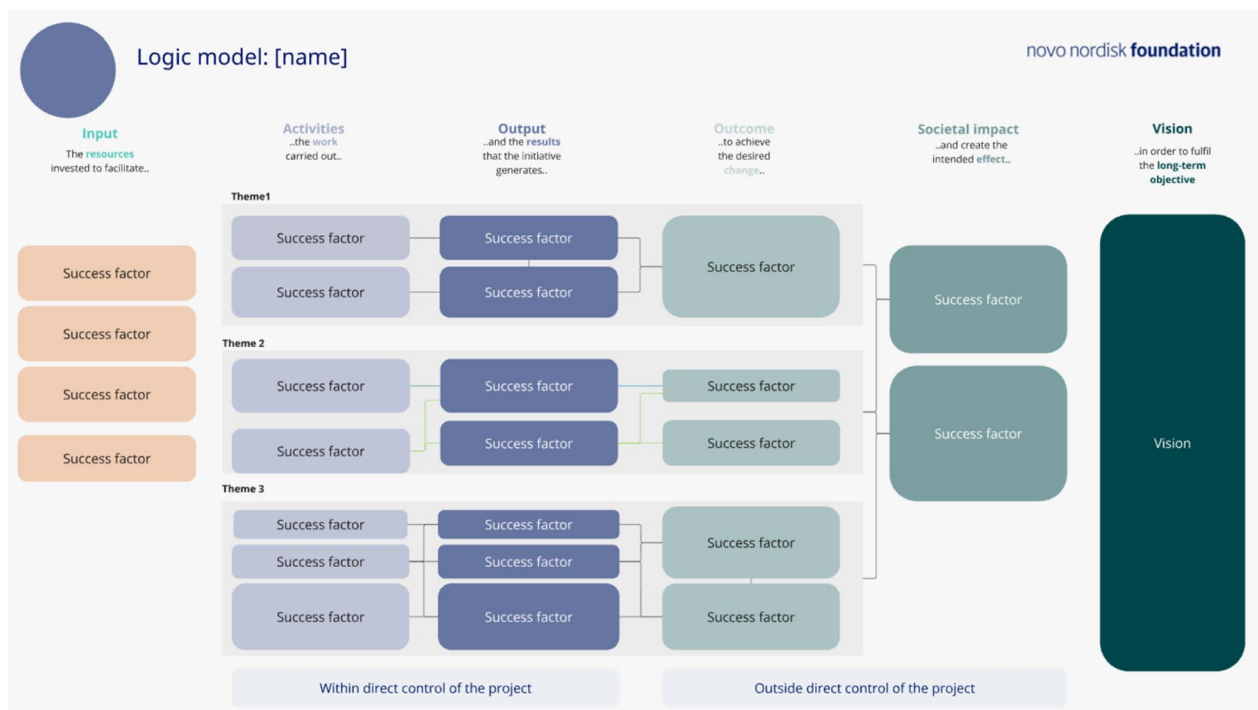


Fig. 4 Building the logic model. Source: Novo Nordisk Foundation/ Impact Management team

to an interactive online multiuser platform for modelling purposes conducted by the Impact Management team. This method entails a reverse engineering approach, starting from the project's vision and systematically working backwards through the impact, outcome, output, activity and input categories. This backwards trajectory through effect-chains serves a dual purpose: ensuring the presence of essential prerequisites for each success factor to manifest, and guiding partners' (and societal stakeholders') attention towards those success factors, propelling the project closer to its vision.

The logic model does not adhere strictly to a linear temporal framework, as it incorporates feedback loops. However, these feedback loops are not visually represented within the model to maintain emphasis on the primary impact pathways and effect chains.

Finally, success factors undergo a weighting process, identifying specific success factors as critical success factors – termed *impact markers* – within NNF. These markers are characterized as indispensable milestones or early indicators of success within the project proposal.

Impact framework process step 3: Early assessment of the potential impact of the initiative

In the second phase of impact management, NNF may engage on its own or in collaboration with the applicant to assess the prospective impact of an initiative. This

provides decision-makers with a clearer understanding of what the initiative might entail and the possible outputs, outcomes and impacts. This step in the assessment process was not included in the original impact framework setup. However, as NNF started using the impact framework approach, the need for mapping the success factors identified in the logic model, scoping the impact potential became clearer. The Foundation then started on a case basis to add this process step to gain more decision information to the approval process. Ongoing work in the Foundation consolidates the approach to scale up initiative coverage.

The assessment will be twofold:

1. Input–output analysis: The Impact Management team can conduct a data-informed assessment of established outputs and outcomes, drawing on experience with similar projects. The analyses use the Foundation's longitudinal data collection from structural, categorical data collection, for example, from grant-reporting platforms such as Researchfish® and third-party databases (e.g. Dimensions®). Whilst offering limited insight into quality, it can reassure decision-makers of productivity expectations and be used to contrast different instruments of choice available. This analysis will highlight the expected timing, size and volume of the initiative, drawing from the Foundation's experience with numerous similar projects.

Areas of focus will include:

- o Team recruitment
- o Type and scale of produced research outputs (e.g. databases, software, interventions or trials and publications)
- o Students taught, researchers trained or educated
- o People reached
- o Impact on research, practice, policy or legislation
- o Innovation outcomes

The Foundation's Annual Impact Report 2021 describes the basis for scaling these types of return-on-investment analyses [46].

2. Societal impact: The Impact Management team may perform or facilitate an external party to perform analytical assessment of societal impact to determine how the initiative can support the Foundation's strategic goals for societal impact. This analysis can range from simple, practical assessments to more sophisticated full-scale evaluations using, for example, life cycle assessment, simulation models or applying cost-benefit models. Simulation models can take on many forms. In search of best-practice societal impact calculations, the Foundation actively supports research teams in developing open-source, research-based and peer-reviewed simulation models that can be used in the funding community by, for example, funders and applicants, but also societal stakeholders such as policymakers.

Two open-source applied research projects awarded funding in 2024 and 2025 will extend Denmark's leading macroeconomic models developed and maintained by the DREAM organization (Danish Rational Economic Agents Model) [55] to improve macro-level assessments of green transition policies and to incorporate population health frailty. They are: "Measuring the economic, environmental and climate effects of the 'Aftale om et Grønt Danmark'" and "Incorporating Population Frailty in Macro Economic Policy Models: Foundations for a New Generation of Targeted Interventions and Labour Market Policy". The DREAM models are central to economic policy evaluation in Denmark as they are used by government and other main societal stakeholders. Both initiatives support estimating societal impact and impact on fiscal sustainability of scaling up promising initiatives. By way of example, the Foundation currently funds an initiative for early screening for atherosclerosis. If effective, the DREAM model could be used for ex ante societal impact assessment of implementing a national screening strategy, which will demand substantial costs in the short run but will pay off in the long run as the early screened population grows older but healthier, drawing less on public finances and with higher labour market attachment.

A similar case can be made for the Lighthouse project, which aims to build healthcare hubs that provide optimal cross-sectoral support for people with obesity and other conditions, relieving general practitioners of the role as suboptimal coordinator.

For environmentally or climate-oriented research programmes, the analysis might include quantification of:

- o Impact on CO₂ reduction
- o Decrease in the use of fertilizers and associated cost savings
- o Increase in biodiversity and its social value
- o Health benefits and socioeconomic value of land use

Impact may take on many forms and thus possible methodologies that can be applied are abundant. For example, when looking to advance a strand of research, a pre-assessment may evaluate the strength of a research community to advance a particular cause.


By implementing this additional process step, the Foundation aims to produce better evidence-informed impact frameworks. Once fully implemented in 2025–2026, the expectations are to have a suite of methodological approaches that can be applied to most of the NNF's large initiatives.

Impact framework process step 4: Implementation of the data model

Implementation of the data model is a co-creation between the same partners (and societal stakeholders) as involved in the creation of the logic model, with the Impact Partner in charge due to the overall data responsibility. The data model template, as shown in Fig. 5, helps to ensure the availability and collection of indicator data essential for monitoring project progress and success. Each success factor within the model is underpinned by one or more indicators, serving as measures of to what degree the success factor has been achieved.

Within the data model, each success factor correlates with one or more indicators derived from data points. Most of these data points are sourced from online reporting systems such as Foundgood and Researchfish®. However, for larger and more complex grants, supplementary reporting methods such as surveys, dashboards, or scorecards may be employed. The Impact Management team at NNF enrich data or perform analyses on the basis of relevance and necessity.

Like the construction of the logic model, the data model is developed in co-creation through physical or online workshops or via an online multiuser interactive board. Approval from the Impact Management team is mandatory for the data model prior to the signing of any grant agreement. Based on the application, which



Data Model

novo nordisk foundation

Outcome	Success factor	Indicators	Reporting system		NNF	Grantee
			Reporting category	Admin. and reporting system (technical ID / FID)		

Fig. 5 Implementation of the data model. An example of the data model for outcomes. Similar data models need to be filled out for input, activities, output and impacts. Source: Novo Nordisk Foundation/ Impact Management Team

includes an impact framework logic model and the accompanying data model, a funding decision is made.

Impact framework process step 5: Monitoring, impact management and impact products

The impact framework is integrated into the grant agreement, encompassing a comprehensive plan that covers reporting, ongoing monitoring and evaluations as shown in Fig. 6. This plan delineates specific data sources and report formats in alignment with the data model.

Application of the Follow Up plan during and after the grant

Throughout the active grant period and extending up to 5 years post-grant, a structured regime of regular reporting is executed, facilitating systematic monitoring predicated on the collected data. The Impact Management team assumes responsibility for ensuring the effective acquisition, cleaning, structuring and storage of information and data within the Foundation's centralized Data Platform.

This monitoring process, grounded in data collection and enrichment of data, serves to collate evidence for organizing and democratizing data. Commitment to transparency and accessibility is underscored by unimpeded access to the Foundation's grant-related data.

By means of an online interactive dashboard, users are granted immediate access to real-time, detailed insights

into grant activities. This comprehensive view encompasses detailed information regarding outputs, outcomes, societal impacts and distribution across various demographics and scientific domains.

Insights derived from this data serve as the basis for reports directed internally to the Foundation's departments, management and board, whilst also informing the Annual Impact Report targeted at a wider audience. Furthermore, these insights foster constructive dialogue with grantees regarding project progression.

Implementation of impact management started in the Foundation in 2021; since then, more standalone projects have revised the impact framework during the grant period or because of preparations for refinancing on the basis of new learnings and insights. This allows for adjustments to success factors and indicators:

- Projects that revise the impact framework are primarily large initiatives with extended project periods. For example, a research centre suggested various enhancements to the impact framework, drawing on insights gained from reporting. The changes e.g. better reflected the significant efforts in organizing training and other initiatives to develop research and technical talent, as well as encompassed a broader range of communications activities to better achieve the desired outputs.

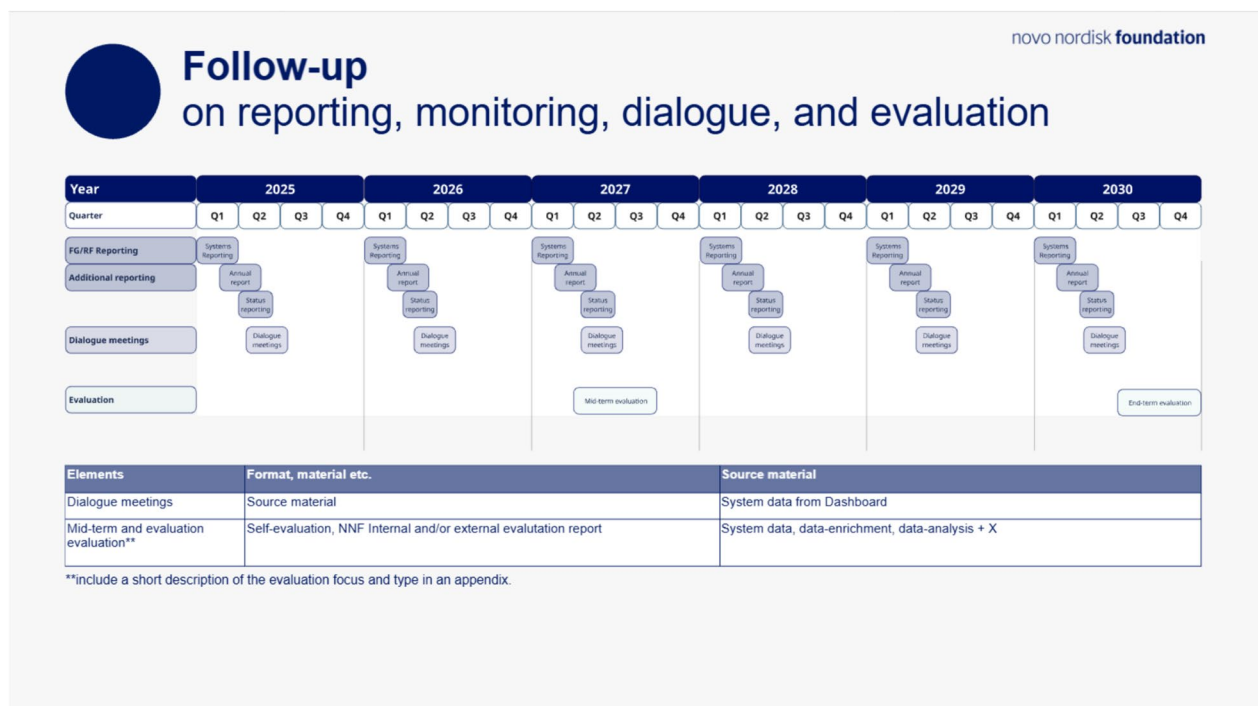


Fig. 6 Interaction plan for reporting, monitoring, dialogue and evaluation. Source: Novo Nordisk Foundation/ Impact Management team

- NNF is now starting to see the first projects that were developed with a full impact framework coming to an end of their project funding and entering evaluation and possible renewal. Two such projects in the sustainability area developed ex ante logic models and data models, and have evaluated their respective programmes on the basis of the identified success factors and indicators. NNF have developed an evaluation guideline on the basis of the impact framework to help applicants and external evaluators actively use the impact framework in their evaluations. These evaluations are a prerequisite for possible renewal. In the renewal process, the logic model and data model are revisited and revised according to the learnings from the evaluation and used as steering tool in developing the application for renewal.

Basing the evaluations and renewal process on ex ante impact frameworks has proven to be a helpful tool in providing a structured evaluation framework between NNF and the applicants. This approach supports both mid-course adjustments on the basis of an iterative process of ongoing experience and formal evaluations upon project completion, ensuring flexibility and robustness in managing and renewing projects.

Relationship with the ISRIA guidelines and advancing the field

Reflection on the evolution of the NNF approach towards impact management reveals a degree of alignment with the 10-point guideline for RIA [30], which NNF co-authored alongside colleagues from the RIA community. This alignment is not coincidental but rather the result of a deliberate and progressive journey that has seen the Foundation's impact culture mature through continuous insights and learning.

Central to the Foundation's strategic ambitions is the profound commitment to tackling global grand challenges, which inherently requires a sophisticated understanding of the research landscape and ecosystem to strategically design projects to contribute to the systemic changes needed to solve them.

The Foundation follows the guideline's focus on context analysis, incorporating the assessment of the research environment and emphasizing an integrative perspective on how each initiative aligns with societal impact goals related to the Foundation's broader strategic intent. The strategy leading up to 2030 exemplifies the Foundation's commitment to societal needs, underscoring the necessity of a responsive context that simultaneously navigates internal dynamics and external macro-related factors.

The Foundation's journey towards embracing impact management as a fundamental aspect of its *modus operandi* reflects a strategic evolution towards cultivating a reflective and learning-oriented culture. As mentioned earlier, this evolution echoes the principles of Advocacy, Accountability, Analysis and Allocation [31], and is evident in the strategic adoption of impact frameworks.

The impact management approach is instrumental in distilling complexity, enhancing the ability to communicate on research impact to individual partners and societal stakeholders. The Foundation is developing towards a more inclusive approach involving stakeholders such as the broader RIA-community and society at large, adhering to the guideline's encouragement for critical framework adoption.

Stakeholder engagement is another facet of the NNF's strategy for implementation of impact management, but one that has still to be fully implemented. The NNF considers the perspectives and needs of both internal and external stakeholders to ensure the success of its impact frameworks, though not yet incorporating a wider range of research users and other societal stakeholders. The definition of stakeholder engagement in the ISRIA guidelines is broad, as identified in the Background section. It does include "research funders", thus the Foundation is already partly aligned with this aspect of the guidelines. NNF recognizes the guideline's support for early involvement of research users and beneficiaries as stakeholders, which nurtures a shared sense of ownership and commitment right from the initiation of the assessment process, increasing both data inflow and data quality.

Over the last 10 years, NNF has organically developed a diverse impact assessment team, covering dedicated professionals from a variety of educational and professional backgrounds, embodying the ISRIA guideline's endorsement of employing mixed methods and diverse data sources as exemplified in the Foundation's output of analyses and reports, ensuring impact assessments stand on a foundation of rigorous evidence striving for robustness of methods and data and trustworthiness of findings and recommendations as emphasized by the guideline. NNF's collaborative practices in co-creating impact frameworks align with the thoughtful choice of indicators and metrics, reflecting the Foundation's strategic priorities and enriching the understanding of project outcomes for all involved stakeholders.

In the Foundation's approach to change management and cultural adaptation of an impact culture, it proactively addresses ethical issues and conflicts of interest. The RIA and impact management objectives are communicated transparently to all stakeholders, as the NNF aims to ensure that the assessments are carried out with

integrity and in harmony with wider societal values, avoiding the pitfalls of reduction to a mere technocratic process.

The structured approach to communication, which includes books, conference papers, journal articles, comprehensive reports, targeted analyses, internal memos and insights, and the open availability of the Foundation's Dashboard, mirrors the guideline's emphasis on utilizing various communication channels. This strategy guarantees that the results reach internal and external stakeholders effectively, fostering a climate of well-informed decision-making. A recent example is a collaborative study with the Northwestern Institute for Complex System, Northwestern University of research funding applications at the National Science Foundation, National Institutes of Health, and the NNF, indicating that promotional language is associated with higher funding success, innovativeness and citation impact, and that women tend to use less promotional language than men. This project is one of several undertaken with partners in the scientific community to advance the use of artificial intelligence (AI) and machine learning in leveraging untapped knowledge in research funding. Findings are detailed in two journal papers [56, 57] and the Foundation's annual impact report 2023 [48].

The Foundation's scholarly contributions and the open sharing of data and insights underscore the guideline's call for knowledge exchange within the RIA community. This approach has advanced the Foundation's bilateral collaborations with numerous funders and universities globally, whilst enhancing its involvement in the Research on Research Institute (RoRI). Together these actions are supporting the knowledge pool and fostering collaborative advancements in the field of impact assessment.

Many of the recommendations in the ISRIA statement [30] focus on how best to conduct RIA, primarily to identify the impact of already completed research. However, in relation to the purpose of Analysis, one of the 4As mentioned previously, some of the recommendations, for example, on identifying stakeholder needs, also overlap into how research might best be conducted in the future to increase the impact achieved. NNF is exceptional in that it embeds itself into the prospective management of research processes in a way that is intended to boost the impact achieved. Therefore, NNF is embedding some of the approaches, such as identifying stakeholder needs, that the reviews of the assessment (health) research impact showed, are found in programmes that have a higher proportion of projects making a societal impact than is found in many other programmes [2]. Such an approach could perhaps lead to the identification of a fifth purpose for RIA, or a fifth "A" – "Achievement" – because the approach is explicitly geared to managing

research in a way that increases the chance of achieving impact.

Challenges, limitations and future steps

Implementing the new approach of prospective impact analysis to inform impact management to enhance the levels of impact achieved has highlighted several challenges and limitations, as listed below. Some of them are specific to NNF's pioneering approach, and others apply more generally to the work of research funders, including when introducing RIA systems. They are being addressed in various ways by NNF.

1. Resistance can result when applicants and stakeholders find it challenging to comprehend the significance of NNF's approach to the vision, mission and effect-chains of projects. Furthermore, whilst they thoroughly understand constructing intervention designs around activities and outputs they can directly control, they are less inclined to embrace success factors that rely on how others may utilize the new knowledge produced by the project. To address these issues, NNF has adopted strategies to enhance understanding and engagement. Providing comprehensive introductions, detailed materials, and collaborative involvement helps demystify the process. Workshops and training modules build competence in using these tools effectively to identify and define key deliverables and effect-chains and a general understanding of how this approach supports the project. Key learnings include the need to integrate impact management into daily work and provide thorough training and materials, and to ensure a forum for detailed discussions on the expectation alignment amongst all stakeholders.

2. A frequent challenge in the field of RIA is the concern that researchers' freedom to pursue their own lines of inquiry may be compromised [7]. These concerns might be particularly highlighted given NNF's co-creational facilitation process, as noted earlier, is set up to ensure alignment amongst stakeholders to recognize ambitions and risks, not only on the project's vision, but also on the metrics for monitoring progress. In relation to such concerns, the Foundation goes to considerable lengths to work with applicants to build understanding of the advantages of the approach being adopted. Furthermore, in general, in relation to the wider Danish research system, the Foundation's governance approach uses an arm's length principle. This means that apart from determining the application, monitoring and evaluation processes to be followed in specific NNF-funded research, the Foundation cannot interfere with a pub-

lic research institution's decision-making power. The main requirement to receive funding from the Foundation is to meet the objectives of the Foundation set forth in its 100-year-old charter.

3. In common with other philanthropic or public research funders, the Foundation could face challenges in relation to the approach it uses for the essential summative judgements that have to be made about research proposals to decide which ones to fund. It is the formal attempt to incorporate prospective impact assessment, both qualitative and potentially quantitative, into this early phase that makes NNF's approach different from that usually deployed. As set out in the relevant stage above, this innovative assessment can be applied as thoroughly as possible, with the time available, sometimes using simple assessments, and at other times richer analysis such as simulation exercises or full cost-benefit. This has to be conducted expeditiously to facilitate a reasonably rapid funding decision, so as to avoid the waste involved if researchers and others spend too long working on potential proposals that are then not funded. Questions can be asked about how far an input-output model or a cost-benefit approach can be used to prospectively make a summative assessment of return on investment, when there are so many inevitable uncertainties in the process, especially for funding of basic research, complex initiatives and initiatives programmed in phases relying heavily on, for example, developmental evaluation. For the purpose of undertaking an evaluation to inform the funding decision, however, NNF has taken the pragmatic decision to use an approach that is more thorough than usually adopted by research funders at this stage, but still has inevitable limitations given the uncertainties of the outcomes. The Foundation is both pursuing opportunities and identifying barriers to the adoption of ex ante analyses but general implementation procedures are still under development.

4. There are further challenges in terms of the most appropriate methods to use for impact assessment in developing the (largely) unprecedented approach of prospective impact management of research projects – as well as other projects and programmes – once they have been funded. The challenges are made greater when the research is in fields aiming for system transformation, with all the uncertainties that might involve, and with evaluation seen as being important for learning and future improvement. Therefore, moving into the implementation phase, NNF recognizes the scope for attempting to cultivate a reflective culture and adopting what might be seen

as a more formative approach. At the same time, as a grant-giving body, NNF has to be compliant with its own accountability mechanisms. Therefore, NNF has adopted a pragmatic approach to meeting possibly competing demands. It has retained a structured system of impact assessment, with a logic model and broad support from the research community, but has also been increasingly flexible in the methods adopted, including applying approaches noted in the Background section on the basis of “bidirectional interaction” [1, 2]. The Foundation inevitably returns to make a summative evaluation and judgement prior to decisions about possible re-funding or prolongment.

NNF attempts to impact manage a series of individual projects or programmes which have their own specific targets within the wider overall vision of addressing Grand Challenges. Therefore, the targets and evaluation of specific projects feed into a wider picture, and it is at the wider level that the Foundation might have greatest scope for adapting to changing situations and learning from the accumulating findings and increased understanding provided by its portfolio of work. As a learning organization, and one of the early partners of the Research-on-Research Institute, NNF is fully committed to evaluating whether its own processes are working successfully. Therefore, NNF will evaluate whether it has been possible to successfully navigate a path that balances the need for accountability with the challenges of identifying progress in areas of high uncertainty.

5. There are currently clear limitations in how far societal stakeholders are directly involved in the approach used by NNF, and challenges in balancing the role for such engagement by societal stakeholders with the greatly enhanced role NNF plays in the funding landscape. And yet, as noted above, such engagement is one of the ISRIA recommendations most clearly associated with achieving research impact, that is, through involving societal stakeholders in the planning and oversight of projects [30, 58]. Traditionally, NNF primarily engaged with societal stakeholders on a strategic level. Nevertheless, as highlighted in connection with the compatibility with the ISRIA framework, societal stakeholders are occasionally invited by principal investigators to partake in projects. The objective is to incorporate diverse stakeholder perspectives early in the project’s development and sustain them through ongoing interactions. As mentioned previously, the Foundation’s commitment to engaging with societal stakeholders is also apparent in the recent collaborative research call initiated by NNF, Wellcome Trust and the Volk-

swagen Foundation, “Transdisciplinary approaches to mobility and global health” [54]. This example has been recognized as being important by leaders in the field of analysing engaged research [34].

As also noted in the Background section, considerable knowledge exists regarding evidence use, but there is still a need for evidence about robust strategies to create the infrastructure to achieve research use [36]. NNF’s pioneering work has created, and crucially operationalized, a research management approach that should mean that as the Foundation puts more emphasis on the stakeholder engagement, also including research users when invited by the applicant, they will be brought into a structure that could mean their contributions could be more impactful than is often the case. Embedding stakeholder engagement into a structure in this way would be in line with various recommendations made as part of an analysis of “design principles” to support the improvement of stakeholder engagement [58].

Inevitably, involving stakeholders closely in the research processes, and especially in discussions about adjusting a project’s impact framework, could create some circumstances in which potential conflicts of interest might arise, but this is best addressed by the high level of transparency in NNF’s approach.

Conclusions

The shaping of NNF’s methodologies and strategic considerations by the ISRIA 10-point framework is indicative of a conscientious and strategic journey. The Foundation’s practices not only generally adhere to recognized best practices, but also drive innovation in impact assessment, fostering a deeper and mission-aligned comprehension of research impact. Overall, despite the need for some further analysis, including around the most appropriate evaluation approaches to use, and for greater involvement of societal stakeholders, the work seems to be heading towards the successful introduction of a new approach that uses prospective impact analysis to inform impact management to enhance the levels of impact achieved.

Abbreviations

ISRIA	International School on Research Impact Assessment
NNF	Novo Nordisk Foundation
RIA	Research impact assessment

Acknowledgements

We extend our gratitude to colleagues in the Impact Management team at the Novo Nordisk Foundation for their assistance in developing the impact framework since 2021. However, responsibility for the views expressed in the paper lies with the authors alone. We also express our sincere thanks to all the applicants of standalone projects and NNF project leads who have helped refine the tools at various stages of the impact framework development. Additionally, we thank all the experts from ISRIA and Research on Research

Institute (RoRI), as well as from the American Evaluation Association and various other conferences who have kindly contributed to improve the concept and implementation of Research Impact Assessment. We are also very grateful to the reviewers and editor whose thoughtful comments and suggestions helped us strengthen the paper in various important ways.

Author contributions

G.V.B. conceived the paper, led the work to develop and apply the approach described and drafted the main section of the paper. H.B.F. assisted G.V.B. in leading the work to develop and apply the approach described, and in drafting the main section of the paper. K.Z.I. contributed to the work to develop and apply the approach described and to the paper. S.H. helped conceive the paper, drafted the Background section of the paper and assisted G.V.B. in leading its overall completion. All authors read, contributed to and approved the final version.

Funding

No external funding was used.

Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

Not applicable. This opinion paper relies on publicly available publications and the experience of the authors.

Consent for publication

Not applicable.

Competing interests

G.V.B., H.B.F. and K.Z.I. are employees of NNF. S.H. received an honorarium from NNF for reviewing a draft report on the impact from NNF-funded research.

Received: 22 February 2025 Accepted: 8 August 2025

Published online: 02 September 2025

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Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

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