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Intermediate review of programme development and implementation – Nordic Innovation operationalisation of the Nordic Co-operation Programme for Innovation and Business 2018- 2021



Final Report
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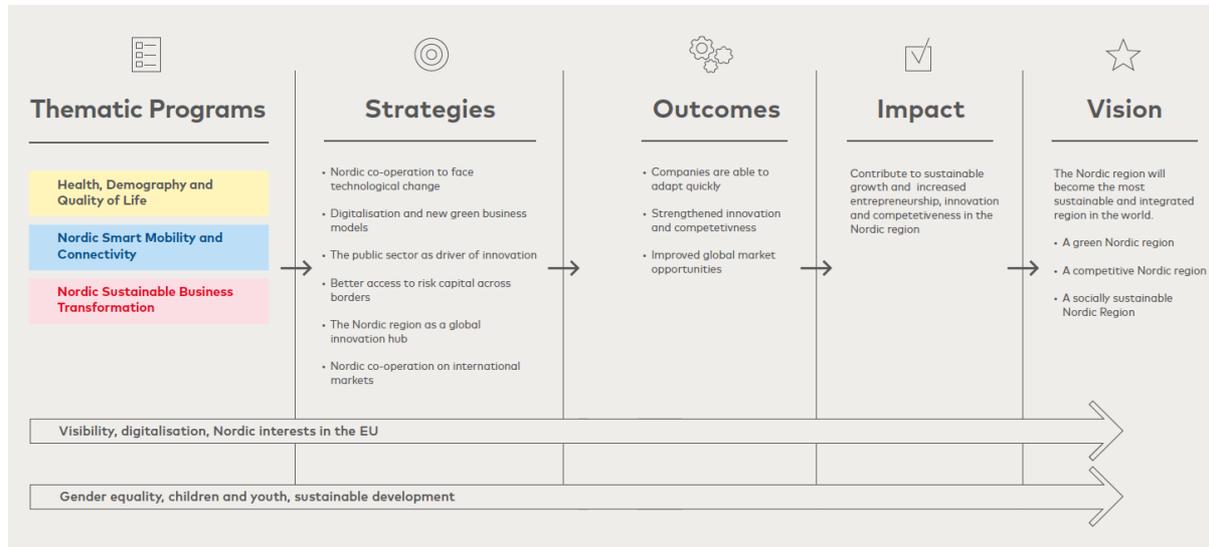
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1. Introduction: scope, objectives and methodology

The scope of this review is the Nordic Co-operation Programme (NCP) 2018-21 and the implementation of the programme via three thematic innovation programmes managed by Nordic Innovation (NI). The programmes¹ are intended to be “*open, wide-ranging and allow for final concretization and delimitation to take place at activity level*”. By using a broad definition, NI seeks to support technological development, innovation and changes that cannot be predicted at present in a concurrent way to stimulate innovation and cooperation across sectors and ecosystems.

Figure 1 : Intervention logic for the three thematic programmes



Source: Nordic Innovation

The objective of the study was to “*Frame concepts and track the development and iterations of Nordic Innovations three thematic innovation programmes, as well as give examples of potential impact. The aim is to nurture learning and to support the development of new innovation programmes and adaptation in dynamic environments.*”

The learning was to include showcasing of examples via a **case study** for each programme, relevant for Nordic and national level stakeholders. Based on the learnings, the final task was to develop **proposals to contribute to the design of new programmes** and the initiatives for the Nordic Council of Ministers Vision2030. The review addressed four **specific issues**:

- Are the instruments used effective and have they generated a real impact on sustainable business growth and Nordic innovation policy?
- How clear is the intervention theory, ref. Theory of Change for each programme?
- To what extent has the programme approach worked, in terms of fostering national anchoring and political interest?

¹ Nordic Innovation uses the US English spelling ‘program’, whereas we use the UK English spelling programme when referring to a policy programme (and only use program for software programs) in line with European spelling conventions.

- What areas of the programmes have contributed most to Nordic value added? Why and what are the background factors?

Figure 2 summarises the objectives and focus areas of the three programmes (a list of funded modules/projects has been provided by NI and is recalled in annex).

Figure 2: The Nordic Innovation 'thematic' programmes

Programme	Objective	Modules (Focus Areas)
Nordic Sustainable Business Transformation (NSBT)	Take circular economy from strategy to business	<p>Competence – driving change through competence and new business models.</p> <p>New Solutions – accelerating business through innovation.</p> <p>Circular Cities – public private collaboration.</p> <p>Ecosystems – building networks and connecting competences and people.</p>
Health, Demography and Quality of Life (HDQL)	Connect people, data and innovation for a better life	<p>Bridging Nordic Data Initiative – innovation through data sharing.</p> <p>Preventive Health – shifting focus from treatment to prevention.</p> <p>Healthy Cities – healthy living and sustainability in Nordic cities.</p> <p>Value Chain Collaboration – utilising the full innovation potential for the Nordics and beyond.</p>
Nordic Smart Mobility and Connectivity (NSMC)	Speed up the transition to a sustainable future where Nordic citizens benefit from innovative mobility and connectivity solutions.	<p>Quality of Life Through Mobility and Connectivity – innovative solutions and concepts (8 projects)</p> <p>Clusters as Drivers – connecting know how (7 projects)</p> <p>Nordic Urban Mobility 2050 – future cities game.</p> <p>Sea Meets Land – emerging solutions for ports, people and goods transport (5 projects)</p>

Source: Nordic Innovation. Summary by authors

The overall financial implementation of the three programmes is summarised below. At the outset of the Cooperation Programme for 2018-2021 a decision was to concentrate 70-80% of our total operational funding to the three programmes. NI budgeted a total sum of NOK 60 million to each of the programmes over the four years period. The allocated amounts (signed contracts with projects) indicate a somewhat variable drawdown of funding. The remaining budget to be allocated for 2021 for the three programmes will be adjusted downwards as the eight new action plans (2021-2024) will be funded with the same budget.

Figure 3: budgeted and allocated funding per programme (thousand NOK)

Programme	Initial budget	Allocated as of 31/12/2020
HDQL 2018-21	60,000	31,400
NSMC 2018-21	60,000	54,280
NSBT 2018-21	60,000	52,765
Total	180,000	138,445

Source: Nordic Innovation Annual Report 2020

The study approach was built on a three-step process as presented below.

Figure 4: Three-step process to assessing effect of the programmes

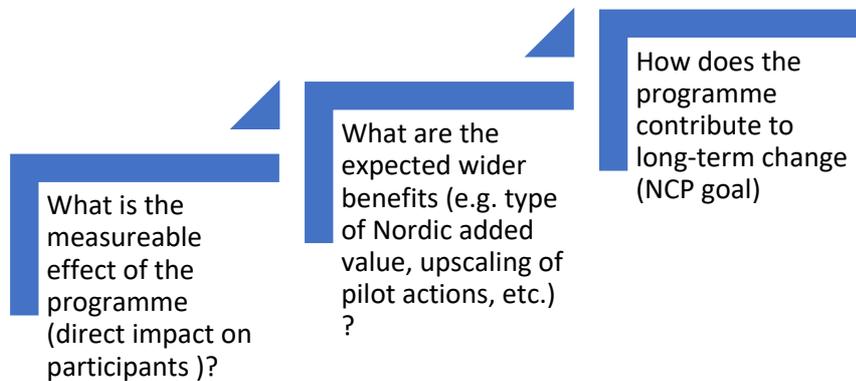


Figure 5 sets out for each of the four specific issues of the review, the main sub-questions and the methods used to assess them.

Figure 5: Overview of the review questions and methods

Core issues to address	Main questions	Methods applied
Are the instruments used effective and have they generated a real impact on sustainable business growth and Nordic innovation policy?	<ul style="list-style-type: none"> Have the instruments led to the generation of results that would not otherwise be possible through national or other programmes? Do the instruments generate sustained impact through enabling scalable and viable business models to be tested? 	<ul style="list-style-type: none"> Evidence base review Case examples

Core issues to address	Main questions	Methods applied
How clear is the intervention theory (Theory of Change) for each programme ?	<ul style="list-style-type: none"> To what extent do programme participants (funded projects) understand the expected effects of the programme (and how their own results contribute to it) 	<ul style="list-style-type: none"> Theory of change 'retro-prospective' review per programme with NI advisors Interviews – stakeholders and project participants
To what extent has the programme approach worked, in terms of fostering national anchoring and political interest?	<ul style="list-style-type: none"> How well have the activities promoted cooperation between stakeholders across the Nordic countries? To what extent have the programme's leveraged national co-funding (as an indicator of interest in the topics) 	<ul style="list-style-type: none"> Evidence base review Case examples Interviews – stakeholders
What areas of the programmes have contributed most to Nordic value added? Why and what are the background factors?	<ul style="list-style-type: none"> Through what mechanisms have the funded projects helped promote a wider understanding of the positive impacts of Nordic cooperation? How novel or innovative are the pilot actions or projects in comparison to what is already done at national level? 	<ul style="list-style-type: none"> Evidence base review Case examples Interviews – stakeholders

The review began with a kick-off meeting between the three members of the review team and Nordic Innovation on 3 February. During the first phase, NI provided us with access to information on the three programmes and the portfolio of projects and other relevant documents such as the background to the operationalisation of the NCP. Following the kick-off meeting and the signing of the contract in February, the study team completed the first task by undertaking a review of this documentation.

In a second step, 2.5-hours group interview sessions were carried out with the Nordic Innovation advisors responsible for each programme during the first week of March 2020. Based on these working sessions, we reviewed the theory of change for each programme and scoped out the case study topics. We selected case studies (one per programme) that tackle a theme, a specific type of result or provide a particularly useful set of lessons on the process of implementing co-operation programmes. The cases focus on a group of related projects (in the case of HDQL and NSMC) or a high impact intervention (in the case of NSBT). The initial case study focus was further refined based on feedback from the NI advisors. To inform both the analysis of the theory of change and expected impact as well as the case studies, we undertook targeted interviews (see list in annex 2) to explore how the instruments have contributed to Nordic added value and to meeting the expected (or indeed unexpected) outcomes on the instrument/programme level as well as the overall impact at the NCP/Vision 2030 level.

In a third step, we drafted the three impact case studies to illustrate the types of impact achieved (or likely to occur in the future) and to capture the learning effects from the implementation of the programmes. The case studies are appended in annex 5 and the learning drawn from the cases informs the cross-cutting conclusions is presented in the main report. The case study findings and the draft cross-cutting conclusions were discussed at a policy workshop on 24 August 2021 and the results of the discussion at the workshop then fed back into the final conclusions and policy options.

2. Theory of change and the programme approach

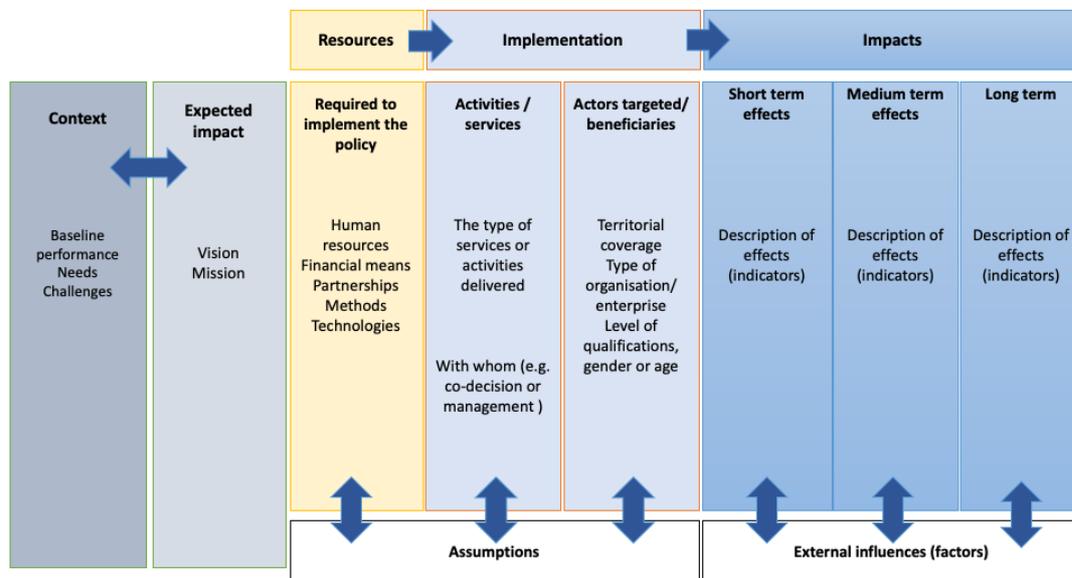
This section addresses the learning related to two of the core review questions:

- How clear is the intervention theory (Theory of Change) for each programme ?
- To what extent has the programme approach worked, in terms of fostering national anchoring and political interest?

2.1 Review of the theory of change for the three programmes

In line with the past evaluation recommendations², at the beginning of the current period, NI adopted a *Theory of Change* approach to try and understand better the potential impact of the programmes. Nordic Innovation’s operationalisation of the high level objectives set in the NCP was thus presented in both the overall intervention logic (Figure 6) as well as three ‘theory of change’ models for each programme. The aim was that “all activities are, as a general rule, linked to the collaboration programme’s objectives, strategy areas and the three thematic areas”; while at the project level, “specific requirements will be prepared for how each project / concept in our portfolio will contribute to fulfilling the overall vision, sub-goals, and be relevant for one of the six strategy areas of the NCP”. Hence, the programme participants involved in funded projects or activities were expected to justify (their application for funding) and hence, theoretically, understand how their activities could contribute to the broader vision/goals at Nordic level.

Figure 6: Theory of change framework



Source: authors

² Reid, A., Varga H. (2016) Evaluation of the Ongoing Nordic Cooperation Programme for Innovation and Business Policy: Final report.

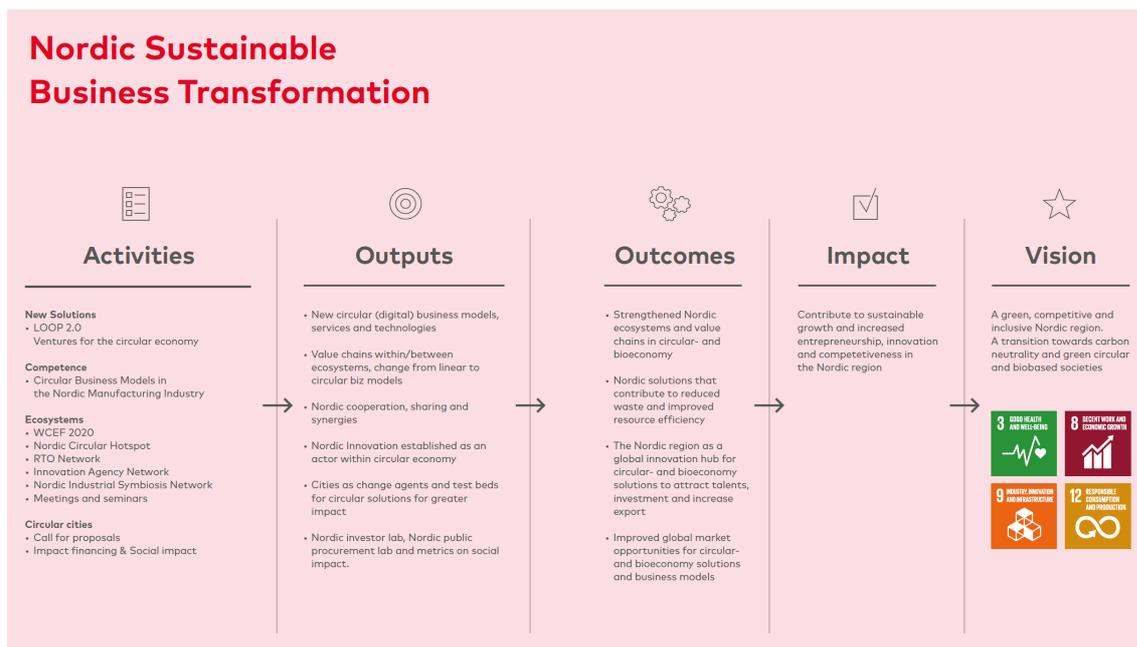
For each programme, we reviewed the work done by Nordic Innovation to set up a measurement framework that enables the short-, medium- and long-term effects to be traced. To do so, we applied the theory of change (ToC) model, using the template in Figure 6, to assess the three programmes.

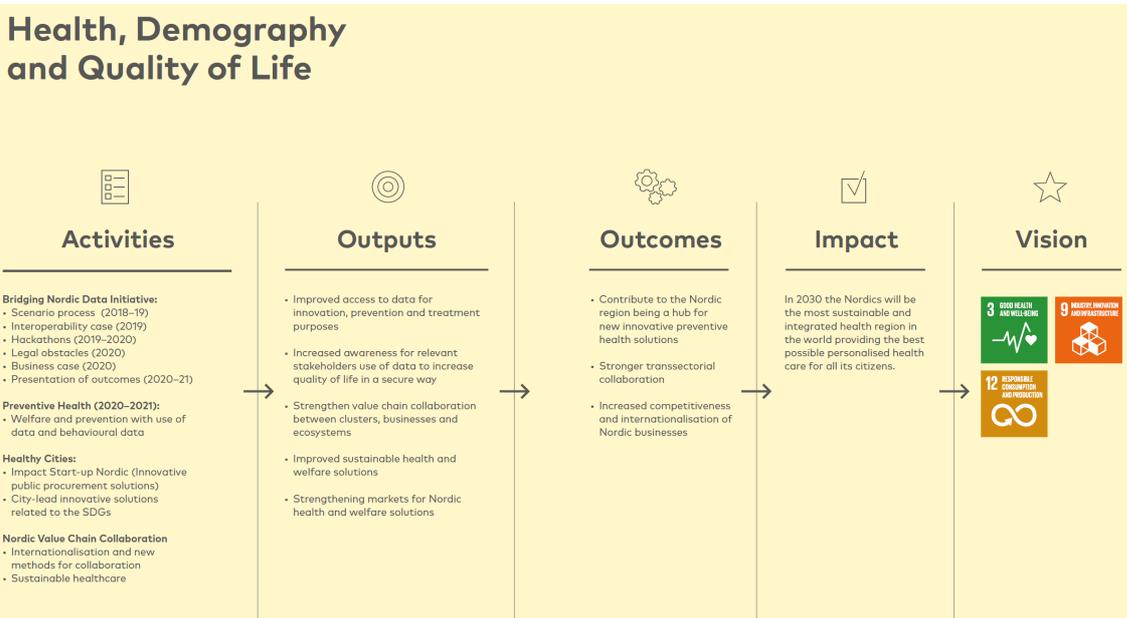
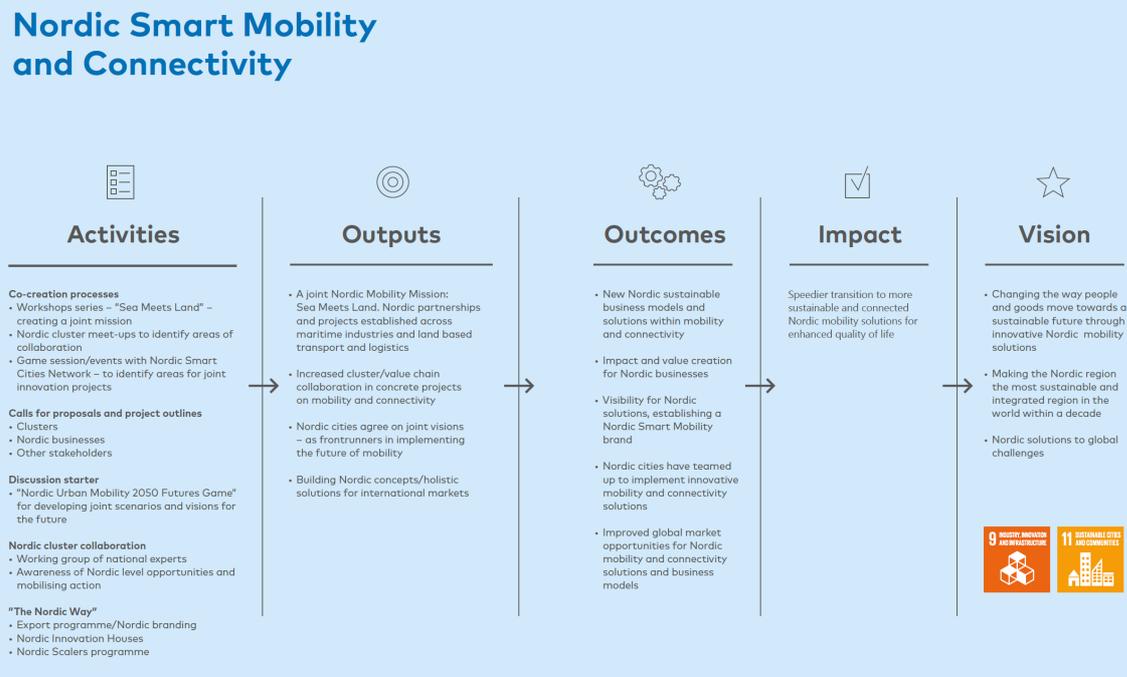
As was noted in Reid & Varga (2016) : “The advantage of developing a theory of change model is that it forces stakeholders to distinguish between ultimate goals, intermediate outcomes and contributing activities, but it also encourages reflection on linkages between activities and underlying assumptions (e.g. in the case of Nordic cooperation that all five countries will provide expert input or mobilise relevant organisations, etc.)”.

Innovation policy has evolved in the last decade with a shift from an approach focused on funding discrete interventions (e.g. programmes funding R&D and product development projects for individual firms often in collaboration with a ‘research partner’ from academic or public research organisations) towards initiatives and programmes that bring to bear a broader range of instruments to tackle a ‘societal challenge’ notably via mission-driven policies that seek to foster ‘system innovations’. This new approach to ‘transformative innovation’ requires mobilising a more diverse set of actors (including users) in a quadruple helix framework. In such a context, the need to develop and define a clear intervention theory is arguably even more important since the outcome depends not on a single intervention within a ‘short’ time period but rather on the combined results of a coherent and inter-related set of actions that over time lead to transformation of a system (health, mobility, circular economy in this case).

The outline theory of change frameworks for the three programmes are reprinted in Figure 7 (taken from the 2019 Annual Report of Nordic Innovation). As noted above, we examined and discussed these frameworks in a working session with the advisors of each programme.

Figure 7: Theory of change frameworks proposed by Nordic Innovation for the three programmes





Source: Nordic Innovation Annual Report 2019

Compared to the generic theory of change framework, these simplified frameworks do not present or codify the context, which, however, has been a core element of the programme design and informed a definition of the activities/instruments/modules that have been used to implement the programmes. More importantly, they do not codify the assumptions made about, for instance, the involvement of national agencies or administrations, additional resources provided by the private sector, etc. Similarly, the potential for external factors to influence programme implementation

should be considered, they may include decisions taken at national level on regulatory or legislative factors that hinder or accelerate the desired outcome, economic shocks or ‘black swan’ type events such as the COVID-19 pandemic.

A key issue is that the impact as defined in the NI’s ToC is generally very broad and even the outcomes are expressed in vague terms (e.g. ‘*strong trans-sectorial collaboration*’ for HDQL) that are difficult or impossible to measure and do not clearly derive from activities or contribute to impact. Interviewees for the three case studies tended to relate to the broad vision and understand the specific outcomes of their projects but had more difficulty expressing how these would lead, in synergy with outcomes of other projects, to the overall programme impacts.

In short, the precise impact pathways between the portfolio of instruments/projects, the outcomes and the overall impact and vision as expressed in the ToC for the three programmes are difficult to trace. Looking at the example of HDQ (see annex 5 for the analysis of the impact pathways of the other two programmes), while the programme’s logic is based on health data and a move to health prevention, some of the activities are far removed from these foundations and are not clearly linked to health data and health prevention. This could be due to the unclearly defined impact of the programme. What is currently called ‘impact’ is the overall vision of the programme but can be broken down to a number of potential intermediate impacts.

Looking into the overall rationale of the HDQL programme and various funded activities the following revised picture emerges with regards to the possible short- to long-term effects (impacts).

Figure 8: Reformulated short-, medium- and long-term impacts for HDQL

Short-term:
<ul style="list-style-type: none"> • Anchoring the vision derived from combined activities • New immediate solutions developed through the hackathons • Build networks lasting beyond the projects initiated through the programme
Medium-term:
<ul style="list-style-type: none"> • Common framework for data sharing for innovation • Amended regulation on health data giving innovation possibilities • Continuation of collaborative partnerships that were established at hackathons • Platform becomes recognised as of value for application developers’ companies • Working business model connecting users and health providers • Collaboration between Nordic cities beyond the programme
Long-term:
<ul style="list-style-type: none"> • Citizens becoming more responsible for their health • Switch to preventive solutions (the 5/5 aspiration) • Offer of preventive solutions by family doctors • Innovations and increase in income through the use of health data

Source: authors based on discussions with Nordic Innovation advisors

As noted above, the potential achievement of the impacts depends on certain assumptions and can be influenced by external factors. For example, national policy-makers have to take some solutions available from the shelf (especially when certain efforts were made to test things regionally);

motivation of different players in the system needs to adjust overtime; the health system needs to be ready to move to preventive care; and regulators need to be ready to embrace the preventive nature of the health system. The role of Nordic Innovation in generating showcases and piloting solutions can offer needed evidence to allow for the changes to happen.

A clearer ‘pathway to impact’ by differentiating between short-, medium- and longer-term effects of the intervention is a first step. A similar reformulation of the effects of the interventions has been prepared for the NSMC and NSBT (see case studies). A second important step is to better quantify (or qualify by techniques such as case studies or ‘story-telling’) the targets in the form of indicators that can be tracked. An example for NSBT would be to track over time the outcomes for the companies that participated in the Circular Business Models (CBMs) in the Nordic Manufacturing Industry workshop series and follow up with these companies 2-3 years later, to 1) see how many of them have implemented CBMs and 2) how many of the ideas that came about during the workshop they have adopted. A success target could be that 75% of the firms have implemented CBMs.

For NSMC, the ambitious objective to *“change the way people and goods are moved and increase the pace of the transition to more sustainable mobility solutions”* is tracked by two specific indicators and were mentioned in the programme report:

- Number of new Nordic solutions in the market generated by the programme
- Number of new Nordic partnerships established through the programme (total, across sectors, or value chains, between cluster/ecosystems)

While the former is an outcome that can be traced, the latter is more of an output indicator that says little about how the partnerships are working deliver concrete results that support the transition to sustainable mobility. Most of the NSMC partnerships are working on feasibility/business cases for the roll-out of existing technology solutions, hence additional short-to-medium term indicators could include proof of concept or successful demonstration of solutions as well as private investment leveraged to ensure further roll-out (e.g. one partnerships expects a major investment in a new green ammonia powered ship to take place). Longer-term impact in line with the NCP vision could then include quantifiable reduction in environmental impact of mobility arising from the deployment of new sustainable mobility solutions.

In conclusion, while the theory of change model has been applied during the design phase of the three programmes, it has not been thoroughly enough developed into a set of verifiable indicators that would enable NI to track the extent to which the funded activities and projects are likely to deliver the medium to long term impact expected.

An additional issue is that while the long-term vision for each programme is understood by the majority of participants, in reality their attention is focused on specific objectives of their own projects with difficulty to place their results in terms of the contribution to the expected impact. This may relate to the insufficient attention to cross-project and cross-programme interactions that is discussed in the next section.

2.2 Effectiveness of the programme approach

Under the new Vision 2030 strategy, eight action plans³ have been adopted at ministerial level (in September 2020) for the period 2021-2024. The action plans provide a broad direction for how Nordic Innovation should prioritise resources and, in dialogue with reference groups (1-2 national experts) develop programmes. Nordic Innovation will then operationalise the programmes via the selection of projects that contribute to realising the objectives defined in Vision2030.

The mid-term evaluation⁴ recommended focusing on a few larger ‘projects’ as the assessment found that the portfolio consists of many small projects, which obscures the picture of the Nordic Committee of Senior Officials for Business Policies (EK-N) and Nordic Innovation's priorities. Fewer, larger projects would make it possible to give more attention to the projects and thus ensure greater impact. There is thus a balance to be found between retaining a structured programme approach for the implementation of the eight action plans and the need to ensure critical mass in terms of project scale (funding, participation, etc.). The replacement of three programmes by eight action plans/programmes would, on paper, imply a greater dispersion of resources and the need for greater attention to cross-programme synergies and coherence (e.g. between the green mobility and smart connectivity action plans/programmes).

In this context, we explore in this section the extent to which the programme approach has worked and the lessons and elements to retain for the 2021-2024 period. Compared to the previous NCP 2014-2017 which was structured in four thematic areas and five ‘lighthouse projects’, the current period adopted an approach via the three main thematic programmes (briefly described in section 1 and further developed in each case study) which absorb about 70% of the available funding (60m NOK per programme over the four years). The three thematic areas are strategically important areas for all countries, based on significant Nordic strengths, are driven by major on-going trends, and offer potential business opportunities globally.

The programmes were developed using a four-step process during 2017-2018:

- Step 1 – Review of experience / learning from previous period and strategic framework for the programming approach (overall Nordic goals, NCP for business and innovation 2018-2021, European policies and UN sustainable development goals).
- Step 2 – Data collection and analysis (part one): review of national, Nordic and European priorities and key players in the Nordic countries. The findings were grouped into three thematic focus areas (possible programmes) and were approved by the board as well as EK-N.
- Step 3 – Data collection and analysis (part two): meetings throughout the Nordic region to map actors and initiatives, collect ideas and ‘anchor’ the three focus areas both internally (the board, EK-N) and nationally (ministerial level, key stakeholders).
- Step 4 – Final programme design and concretisation of modules and activities for the respective programmes.

³ The plans cover: Sustainable Construction, Smart Connectivity, Nordic Green Mobility, Circular Business Models, Sustainable Minerals, AI and Data, Life Science and Health Tech, Sustainable Ocean Economy.

⁴ Lauritzen Consulting. Midtvejsevaluering - Nordisk Samarbejdsprogram for Erhvervs- Og Innovations-Politik 2018-2021, September 2020

According to internal NI documents (Styrsak 2018/20), an important overall objective of the process was to create a holistic and coherent business model: *“Individual projects, activities and initiatives should all be seen in context and be rooted in the strategy and priorities made within the framework of the cooperation programme’s objectives, strategies and the three thematic areas, thus laying the foundation for the operational work process and results-based management”*. As noted in the introduction, the programmes were designed to be explicitly cross-sectoral by bringing together actors from across different industries and from the quadruple helix (public, private, not-for-profit and citizens as users). The expectation was that Nordic stakeholders would work to generate new or combine existing solutions by mixing expertise from different sectors and countries that together contributes to the vision set at programme level. There were also potential cross-linkages between the three programmes and with other actions funded under the NCP (Prime Minister’s initiatives, Nordic Innovation Houses, etc.) that were expected to be exploited during implementation.

At the programme level, the choice was made on what to focus and how (a portfolio with a mix of instruments) but not on which technologies/solutions to prioritise, the latter being generated in a more bottom-up manner by the stakeholders. A reason for the need for strong anchoring among industries and companies is because they are expected to pay at least 50% of the project costs. External funding from project partners is important because it underlines that the selected topics are priorities for companies, it provides anchoring at the business management level as there is a decision to allocate financial resources, and the leverage of private funding means Nordic Innovation’s own resources (from the Nordic Council of Ministers’ budget) stretches further.

The three programme management teams, while following the four main steps, adopted different processes and methods to design and implement the programmes.

The **NSMC programme** team worked through a process of consultation with stakeholders to set a broad direction with respect to identified challenges but set priorities that were intentionally cross-sectoral and defined in an open manner to ‘allow for final concretisation and delimitation to take place at project level’. To do so the programme advisors adopted two main methods. In a first instance, they launched two ‘sketch competitions’ that invited potential partnerships to submit ‘project outlines’ (funded up to NOK 200,000) as a tool to gather ideas for the final programme definition, as well as to mobilise stakeholders to initiate cooperation and raise interest in new areas for innovation cooperation in the Nordic region. In a second step, a mission approach was adopted with again a call for (pre-)projects to source possible solutions. The aim was to pick the best projects and the best consortia amongst the applicants *“without a pre-defined idea of how they should be organised or what their main focus should be. The call/mission texts defined a framework and overall objectives”*. This was confirmed by interviewees who stressed that they were encouraged to be ambitious: *“in their approach NI adopt a very good balance between solving practical problems and aiming at the bigger picture. NI pushed us to go for what was probably our 4th option, the most difficult but also the one with the highest potential value”*.

In contrast, **the NSBT programme** has adopted an ‘organic’ process based on a co-creation with stakeholders to develop projects and activities that contribute to the overall desired end outcome. 15 projects were financed during the period covering a wide variety of activities in support of: knowledge and best practice exchange, pilots, feasibility studies, collaboration and developments of ecosystems, processes, test beds, export promotion and awareness raising. The aim was to create networks and collaboration, bring silos together and involve a wide range of stakeholders across the borders, to

exchange and develop ideas and find solutions. Overall, the approach can be summed up as testing and experimenting a portfolio of pilot actions and innovative methods that sought to raise awareness of and get (manufacturing) businesses involved in practical circular economy actions. Given the limited budget, the aim was to engage with a few 'ecosystems' (e.g. the Nordic Circular Hotspot initiative) that could showcase what is possible 'to do today'. Despite the COVID crisis, the awareness raising channel has worked quite well given a range of events (circular summit, circular arena, etc.) that reached a relatively broader audience by shifting online.

The **HDQL programme** sought to build on the common strengths in healthcare by adopting an approach that went beyond the traditional view of which institutions are part of the healthcare systems. Based on an initial mapping, complemented by a series of events, the challenge was to change the way the system and society looks at health care. The focus was placed on data as the foundation for this change given the observation that national policies towards health data are very different and efforts are needed in this area if Nordic scale solutions are to emerge. By involving a diverse group of ecosystem players as partners as well as potential buyers, the expectation was that the set of activities would bring more innovation and allow to bring actors from what would have otherwise been silos. The initial stakeholder mapping (covering, for example, cities and institutions in charge of data and data sharing) facilitated the involvement of cities to enable to test and pilot ideas and solutions. The programme leitmotiv around data (sharing) guided the selection of events, activities and studies that were implemented, with the aim to pilot and showcase possible solutions. Building on the Bridging Nordic Data report, a call for larger scale use cases, delayed by the COVID-19 crisis, was launched in spring 2021, to conduct a simulation with businesses in diverse sectors related to health, life sciences, etc. to show how achieving greater data interoperability will help achieve the 2030 goals (in the case of health the 5/5 aspiration for increased prevention). This latter call is in line with the aim of the programme to showcase possible solutions and see what comes out in practice – both in terms of the results as well as possible obstacles. This ensures a feedback loop, which is crucial for better understanding of the user groups and further development of shared ideas. This is where the Nordic Innovation supported activities can be considered to be key, i.e. to have demonstrators and valuable cases bringing this learning back in a feedback loop to both Nordic level and national stakeholders and user groups.

In summary, the approach to programme implementation has been based in all three cases on extensive consultations with stakeholders and users, including from business and public sectors, to develop a shared vision and then to test a portfolio of possible solutions. The three programmes offer distinct examples of how to organise programmes to address Nordic level priorities. One programme (NSMC) favoured a staged call for projects process in order to develop Nordic level partnerships capable of driving forward solutions; while the other two programmes adopted an approach based more on a portfolio of activities (events, reports, pilot actions, etc.) that sought to build a shared awareness of the potential for Nordic level co-operation and encourage testing or trialling of solutions or models relevant for businesses.

One aspect related to the management of all three programmes is that given the objective to fund portfolios of projects or activities that are either experimenting with alternative solutions to the same challenge or are expected to contribute towards a shared overall vision, there is a need for greater attention to ensure cross-linking of projects and project results within programmes as well as between programmes and programming periods to capitalise on achieved results. Overall, interviewees stressed that the opportunities to meet and exchange with participants from other projects were

valuable but had been limited over the period since the launch of the programme. All three case studies underline that there have been missed opportunities to strengthen such interactions (partly due to the COVID-19 situation although this is not the main explanatory factor in our view).

In all three cases, the objective of ‘breaking down or working across silos’ by involving stakeholders from related but distinct sectors or value chains or policy areas was a core element. Linked to this aim, the ecosystem concept was promoted and Nordic Innovation sought to position itself as an intermediary or ‘change agent’ helping to foster the emergence of new Nordic level partnerships that connect relevant competences and users and suppliers that support transition. An example is the approach in the NSBT programme, where Nordic Innovation aspired to develop a Nordic ecosystem by combining elements of what is being done at national level (e.g. from Finland with SITRA’s work on circular economy) to help boost the transition through Nordic co-operation (bringing together national ecosystems). In this field, Nordic Innovation’s efforts have also drawn inspiration from other countries, notably the Netherlands, and co-operation with the OECD was used to both promote Nordic expertise and learn from what is being done elsewhere in building circular economy ecosystems.

Given this differentiated approach to programme implementation, the questions of how well the activities have promoted the emergence of new Nordic wide cooperation and helped to leverage national co-funding (investment) across the Nordic countries are relevant to address.

In terms of involvement of all Nordic countries in programme activities, the overall pattern in terms of partners involved in projects tends to vary depending on the topic and type of project. The majority of projects that concern piloting solutions or more specialised topics where not all countries have a direct interest tend to involve representatives from 2-3 countries while a smaller number of projects that are of strategic interest or require Nordic wide expertise or the mobilisation of a critical mass of resources to be successful achieved a broader participation (e.g. Nordic Network for Electric Aviation, Next Wave on hydrogen powered trucks, Nordic Healthy Cities, etc.). Outreach at programme level across all Nordic countries was ensured through the range of events organised (including hackathons) by Nordic Innovation or by funded projects. The case studies underlined that in all three cases the policy development/priorities on the topics addressed varies across countries and hence while fostering participation from all countries is important, it can be considered acceptable that not all countries participate to all projects if the results/learning are disseminated to all. Nevertheless, some activities would benefit from a wider participation, e.g. to ensure a broader representation of all countries in key strategic developments of new value chains or business ‘ecosystems’ at Nordic level.

In terms of financing, NI funding is viewed as giving the Nordic partners *“reputational credit and common money.”* While the scale of funding is not significant (compared to national or EU funding programmes), the NI funding is viewed as critical in providing a means to ‘oil’ the co-operation amongst Nordic actors who individually have elements of the required solution and therefore by bringing them together the NI project helps to foster a process of co-creation and to some extent ‘platform’ building (particularly the projects involving larger ‘anchor firms’ or Nordic wide partnerships). As a NSMC interviewee noted: *“The advantage is that otherwise we would have to go to the boards of the big organisations and ask for money, with the NI funding, we have been given a push to act, to be quick and just do it. I can just hire someone and get the work done”.*

In this context, Nordic Innovation funding can be viewed as ‘seed funding’ which involves taking a calculated risk to initiate new forms of co-operation/ecosystems at Nordic level. There is an expectation that once the project is off the ground other (national public, private, EU, etc.) funding

and/or business models should step in and take over. However, if the objective is to continue beyond the lifetime of the Nordic Innovation funding, as with for example the Nordic Circular Hubs, then having national buy-in (with some public or private money attached) from the start is important. This implies a careful analysis of the national stakeholder that need to be involved and how it is linked to potential (co- or follow-on) national funding. As was noted in the HDQL case, when it comes to a topic like health data the responsibility is spread, which needs to be acknowledged and leveraged both in terms of political as well as financial/investment buy-in (national anchoring).

3. Learning from the impact case studies

This section addresses the third and fourth core questions of the review:

- Are the instruments used effective and have they generated a real impact on sustainable business growth and Nordic innovation policy?
- What areas of the programmes have contributed most to Nordic value added? Why and what are the background factors?

This was done through the development of the three impact cases. Interviews were carried out and triangulated with other evidence to ensure that the conclusions reached are as robust as possible.

3.1 Effectiveness of instruments applied during 2018-2021

The mid-term evaluation of the NCP (Lauritzen Consulting, September 2020) carried out for the Nordic Council of Ministers provided an assessment of all funded activities funded under the NCP including those managed by Nordic Innovation. The findings did not provide sufficient learning on the instruments used and their potential impact (e.g. in terms of system change at Nordic level induced by the interventions). This section seeks to explore the interventions at a level above the individual projects by considering the portfolio of instruments applied by each programme.

The range of innovation policy instruments open to Nordic Innovation is much more limited than that of a national agency. Considering for instance, the classification (taxonomy) of policy instruments applied by the OECD-European Commission's STIP Compass survey⁵, instruments are grouped in five main blocks : Governance, direct financial support (including equity and innovation vouchers), indirect financial support (tax measures), collaborative infrastructures (soft and physical) and guidance regulations and incentives. In previous evaluation work (Reid & Varga, 2016), we grouped the then portfolio of instruments of Nordic Innovation into six main categories: policy design (studies, workshops, consultation), networking and & Nordic business service projects, testbeds, challenge competitions, design competitions, export promotion and (Nordic) branding. These instruments were assessed by applying four criteria: visibility, intrusiveness, cost (absolute and relative effectiveness) and automaticity (use of existing structures or creation of new ones).

As part of the design of the implementation of the NCP, Nordic Innovation prepared several working documents that set out the key concepts. In January 2018, a working note on Operationalisation of the Nordic co-operation programme for business and innovation policy 2018-21 and further development of Nordic Innovation's strategy (*SAK 2018-05 Vedlegg 1*) identified the three broad

⁵ <https://stip.oecd.org/About.html>

groups of instruments (tools) that Nordic Innovation could use to achieve the objectives of the NCP (figure 9).

It was noted that *“All tools and concepts / modules can be used alone or in combination within all thematic areas”*. The note also indicated that *“Clear definitions and purpose descriptions will be available for each of these instruments and modules. The choice of tool will be based on a specific assessment for each individual project: What do we want to achieve? How can we reach the most relevant actors and bring out the best projects?”*.

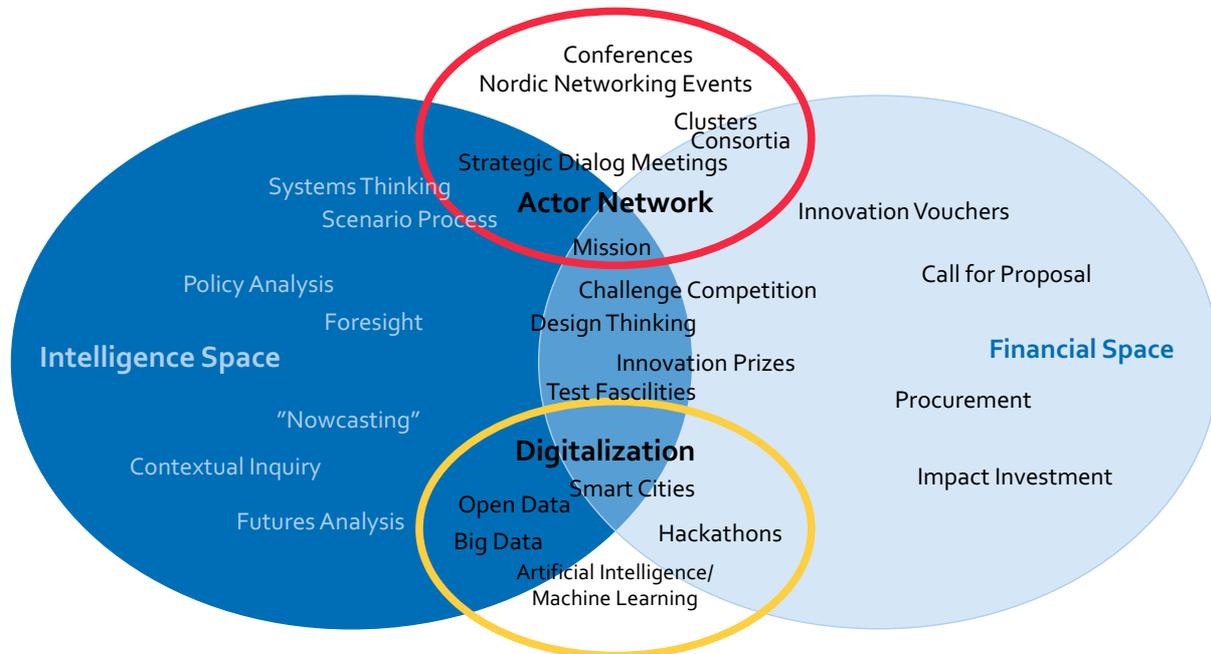
Figure 9: Nordic Innovation’s characterisation of instruments

Type of instrument	Description/examples
Innovation projects	Intends to produce a concrete innovative solution / service / product / process / business model etc. in response to a specific problem or challenge in the market. We help solve the community's problems. Such projects could be, e.g. linked directly to the UN's sustainability goals.
Modules / concepts	Intended to support Nordic companies in achieving their innovation / growth / internationalization ambitions. Examples: <ul style="list-style-type: none"> - Growth / scale-up - Nordic brand - Nordic innovation houses - Business support programmes - Financing - Test & invest / test facilities - Nordic to global (export)/Inward investment - Entrepreneurship
Tools (instruments)	Represents various ways of bringing in project ideas and proposals, for selection and financing. Examples: <ul style="list-style-type: none"> - Call for proposals - Challenge competitions - Innovation prizes - Procurement - Nordic big missions - Nordic networks (e.g. clusters)

Source: Nordic Innovation, working note January 2018

Internally Nordic Innovation also grouped the instruments in four ‘spaces’: intelligence space, financial space, actor networks, digitalisation, visualised in a Venn diagram (see below).

Figure 10: Four groups of instruments



Source: Nordic Innovation

While this structuring in four 'spaces' is visually interesting, the reality is that funded projects are likely to combine elements from several spaces (e.g. smart cities working via a call for proposals that organise events, etc. or clusters working to develop test facilities applying digital solutions, etc.).

In practice, the three programmes have used project-based funding (either through calls or procurement of studies) combined with a mix of other 'instruments' for partnership/ecosystem development and knowledge development. As can be seen from Figure 11, all three programmes adopted a mix of instruments ranging from publications and studies, through networking events, hackathons to support solution development, project funding, partnerships and ecosystem development, etc.

Figure 11: Instruments mix per programme

Programme	Instruments mix
HDQL	<ul style="list-style-type: none"> • Projects: Nordic Healthy city projects • Nordic Digital Health Platform • Health hackathons • Events, e.g. Nordic Impact Business summit • Publications: Bridging Nordic Data, Nordic Digital Health Solutions for COVID-19 brochure • Export promotion (USA, China) • Scale up support: Impact Start up Nordic (not clearly health focused)

Programme	Instruments mix
NSBT	<ul style="list-style-type: none"> • Circular business models programme (business support) for Nordic manufacturing companies – ecosystems • Nordic Circular Hotspot 2.0 • Calls for proposals for Circular Cities and New Circular Solutions • Events: Nordic Circular Summit, World Circular Economy Forum • Nordic Circular Economy Playbook • Hackathon (Nordic/Canadian)
NSMC	<ul style="list-style-type: none"> • Calls for proposals for innovation projects – new solutions and concepts in smart mobility and connectivity • Mission type partnerships working in specific strategic topic areas • Collaborative ‘game’ : Nordic Urban Mobility 2050 Futures Game

Each programme was structured into ‘modules’ corresponding, broadly, to four generic types.

Figure 12 : Programme modules

Generic Modules	HDQL	NSBT	NSMC
Knowledge sharing	Bridging Nordic Health Data	Competence	Clusters as Drivers of Nordic Smart Mobility and Connectivity Competence
Testing (scaling) new solutions	Preventive Health	New solutions	Quality of Life Through Nordic Smart Mobility and Connectivity
Urban dimension	Healthy Cities	Circular cities	Nordic Urban Mobility 2050
Nordic ecosystems	Value Chain Collaboration	Ecosystems	Sea Meets Land mission

However, the specific instrument mix varied significantly across the three programmes and the extent to which the instruments were mobilised to deliver the four modules also differed:

- For NSMC, the approach adopted was a form of ‘portfolio management’ based on calls for projects combined with support for mission-driven partnerships to address two broad priority themes: seamless, integrated and people-centric mobility and Sustainable, secure, energy-efficient and decarbonised mobility. The programme has been steered strategically around the priority themes while giving participants freedom to opt for the best available solutions to achieve the aims. The calls/mission instruments were chosen as the best means of transcending traditional value chains and bringing together players with related competence to test ‘close to market’ solutions. The collaborative game instrument seems to have been used independently of the main projects as an awareness raising tool.

- Under NSBT, there has been a diverse set of activities and instruments deployed focusing notably on testing and putting into application new business models and solutions for manufacturing industry. There has been a mix of smaller and larger projects ranging from workshops on specific niche to broader based initiatives like the NCH, again with an emphasis on working across ‘silos’ and bringing together a wide range of stakeholders.
- In the case of HDQL, the selection of instruments was both ‘strategic and opportunity based’. The individual ‘projects’ are in fact a set of instruments driven by a common theme of ‘data in healthcare’ as the starting point. A core objective was to ensure the ‘involvement of a broader ecosystem than those stakeholders which are classically considered as part of a healthcare system.’ There was also a balance sought between instruments (projects) that achieved ‘immediate impacts’ and ‘small money for big impact’ (the Nordic Digital Health solutions for COVID-19 being cited as an example).

Overall, the distinction between the types of instruments used by each programme relates more to the process chosen than the types of actors targeted (all three programmes sought to mobilise a diverse set of participants from public, private and to some extent academic/not-for-profit sectors). The open call for projects remains a core ‘instrument’, especially as depending on the definition of the call objectives, participants, etc. means that it can be used to provide directionality (intended outcome) while not pre-selecting solutions (which can come in a bottom manner). A project can also combine a number of specific instruments within one package, while a group of inter-linked projects may deploy a sub-set of instruments that together deliver on a common goal.

In practice, Nordic Innovation advisors have worked to pre-identify possible participants as part of the mapping process or during events organised via the programmes ensuring both some continuity with past programmes as well as the introduction of new players to favour novel approaches. Many interviews underlined that compared to EU or national programmes, the costs of entry into a project is lower for Nordic Innovation even via the call for projects process. Participants consider the Nordic Innovation approach and culture is ‘straight forward’ as the advisors focus is on looking for Nordic added value, the unique elements in the Nordic region that brought together can be generate broader innovation.

In terms of **impact**, the mid-term evaluation and the annual reporting of Nordic Innovation both underline that it is still ‘early days’ to judge the final impact on the Vision 2030 type goals or even to some extent the short- to medium-term effects of the different projects implemented via the different instruments. The case studies provide some pointers as to the relative effectiveness of the interventions but, in most cases, we have also found it too early to draw definitive conclusions on the sustained impact of the instruments. Nevertheless, Nordic Innovation has been able to catalyse or activate stakeholders across the Nordics, to come together and collaborate around issues that can contribute to move towards the vision. For the NSMC programme, we assessed both the short-term (end-of-project) result and the expected contribution to the 2030 vision. A few of the broader ‘ecosystem/new value chain’ type projects (NEA, NoGaps, ZEEDS) were considered to have a potentially major impact on the targets set. In contrast, projects that are less ambitious (network development, missing larger or anchor companies) or ‘small scale’ appear to offer less obvious value added in the NI portfolio. The level of ambition of projects should be more clearly considered for future funding rounds. Funding smaller projects can be justified, if they be used as a proof of concept (PoC) for other larger scale applications/ initiatives. For example, under NSBT, smaller projects worked well as a showcase example for Nordic Circular Hubs to promote the circular business models.



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Moreover, Nordic Innovation has funded single activities that seem likely to have a significant impact on the vision building. For instance, the Nordic Circular Arena or the Nordic Circular Economy Playbook.

The key barrier to sustainability is rarely seen to be technological, rather the issue tends to be twofold: proving the business case to encourage first mover investment in emerging value chains; and regulatory and procedural barriers lifted in a harmonised way across the Nordic region to enable scaling (e.g. for data driven solutions). Moreover, sustainability generally requires access to additional or new funding sources beyond the lifetime of the Nordic Innovation funding, given, the ‘self-financing after project period’ criteria. While this focus on ‘financial self-sustainability’ is correct, there is a need for Nordic Innovation to take into consideration the differential possibility for Nordic stakeholders to build, scale and further develop cooperation after the project has ended, to create sustainable impact. In particular, a distinction can be made between projects that are focusing on demonstrating or pilot specific solutions and a related business model; and those that require longer-term investment in ecosystem building, network infrastructure (e.g. new energy supply) or regulatory change that is independent of the solution provider, etc. As one interviewee noted, *“trust building in ecosystems, take time especially as what we are working on is a system innovation not a technical issue, it is change management. Stepping up and taking decisions that are not good for your individual business in the short term but can ensure your own and Nordic competitiveness in the longer run”*.

3.2 Contribution of the programmes to Nordic value added

The concept of Nordic value added is defined by Nordic Innovation as being based on *cooperation across national borders that creates new synergies and leads to greater benefits than each country can obtain individually. “Nordic Innovation seeks activities which encourage results that would not otherwise be possible”*.⁶ This is a high bar to set since, in many cases and rather logically, the Nordic co-operation is building on funding or activities that have built up a foundation at national level. The additionality of the Nordic level intervention can then be judged by the extent to which specific barriers are removed (e.g. to scaling a national solution at Nordic level) or opportunities for combining national ‘pockets’ of expertise that together generates a unique Nordic solution are seized.

In past evaluations (Technopolis Group, 2015, Reid & Varga, 2016) the concept of Nordic value added has been further developed to differentiate the specific results of Nordic level programmes on generating a strong **Nordic internal market**, on piloting and rolling-out **Nordic wide solutions**, in developing or reinforcing **common Nordic policies and standards** and in improving the international visibility and value of the **Nordic brand**. These four sub-types of Nordic value added remain relevant to the current suite of programmes examined in this review. The three programme case studies outline different ways in which Nordic Innovation has sought to foster Nordic added value.

Stronger Nordic internal market

The concept of a stronger Nordic internal market can be viewed from several angles but essentially can be thought of as new or reinforced cooperation between national actors in the form of public-private partnerships, business, financial or innovation networks that has (or is likely to) generate a

⁶ <https://www.nordicinnovation.org/what-we-support>

stronger Nordic internal market. The results can be seen in enhanced access for national firms to Nordic wide markets or investment funds leading ultimately to growth in Nordic market value.

The three programmes have focused on various measures designed to strengthen the possibility of cross-border business within the Nordic area. In the case of **HDQL**, the overall vision of making the high-quality Nordic health data transferrable across the borders should, in the long-term, allow Nordic businesses to optimise this data and harness the possibilities to develop products and services based on a common data framework. While national regulations on health data remain currently a key parameter for businesses working in this field, this limits the potential to develop scalable solutions. If the data can be pooled and transferred within a common Nordic framework, it will allow Nordic players to innovate and increase income but also compete with the ‘global players’ from Silicon Valley.

In the case of **NSMC**, the mobility transition requires cross-sectoral interaction that to be successful will generate new value chains. In many cases, elements of these value chains will originate nationally but to be complete almost always require Nordic level business to business co-operation. The Nordic added value is clear for these cases where a leading group of business/innovation/public players are aligning their efforts towards the emergence of new value chains or ecosystems, such as in the field of green shipping or electric aviation. In some cases, in the mobility field, the potential for scaling requires similar common approaches to data regulation

Similarly, for the **NSBT** programme, while the opportunity for the Nordic countries to enhance circular economy exists at a national level, the full market potential of circular resource flows can be captured at a multi-country level where different producers, users, processors of materials can link up to optimise material flows circular. As the case study underlines: to create a Nordic circular market, there is a need to overcome a range of barriers: regulatory & political; economic; technological; structural; and knowledge and cultural. For instance, if a company in Denmark cannot import a certain type of waste from Sweden that it needs for a circular product, then this is a barrier to a Nordic circular market. Or the other way around, if one Nordic country introduces measures that promotes circular activity practices, like the lowering of VAT in Sweden for products that are repaired, then this could provide a front-runner model for other Nordic countries to follow suit. Hence, developing and testing circular business models (CBM) at company level, as has been done under the programme, needs to be complemented with a coordinated policy response and on-going business ecosystem development to enable a generalisation of circular business practices.

Overall, the challenge is that Nordic Innovation support is to a subset of market players, for a time limited period with limited funding. While this is unlikely to generate new value chains or ecosystems alone, it can enable the piloting/testing of solutions, identify and, hopefully, in many cases, jointly address remaining regulatory barriers, etc. and by providing a Nordic level ‘quality label’ to new business models potentially impact the broader Nordic market and beyond.

Piloting Nordic wide solutions

As noted above, the development of Nordic solutions is an explicit objective of the programmes. In the case of HDQL, health data can be used to improve quality of life in the Nordics (by helping the transition from a focus on care to prevention), while at the same time it provides opportunities for the development of new innovative solutions, supporting Nordic companies in strengthening their competitive advantage. The Nordic Interoperability Project (NiP) focused on building Nordic Interoperability showcases to spark new ideas and solutions for the future; establishing physical and

digital meeting places for discussions and knowledge sharing; and developing new commercial interoperability solutions for the Nordic healthcare industry. One of the showcases focused on technical interoperability and a solution for sharing data (Nordic Data Lake using a common artificial intelligence model) was designed and tested to show how data can be combined across national boundaries to generate a critical mass for solution developers.

Similarly, both the NSBT and NSMC programmes aimed to pilot (and then help scale) new Nordic solutions. The former to facilitate the development of new Nordic solutions that can enable the transformation towards a circular economy; the latter sought to increase the pace of the transition to more sustainable mobility solutions and set a specific indicator related to the number of new Nordic solutions in the market generated by the programme. Solutions developed and shared at Nordic level can help resolve challenges facing smaller, specialised firms across the region that individually would struggle to meet the transition challenge. For instance, under NSBT, the project Metal Waste Reduction in Tinsmith Workshops sought to pioneer solutions with a sub-set of more advanced companies that can help meet the aim of a 30% metal waste reduction for the 1,600 or so tinsmith workshops across the Nordic countries, helping maintain a competitive edge.

Under the NSMC programme, the solutions developed range from those targeting personal mobility, e.g. the NOMAD which developed a proof of concept and has begun pilot testing of a cross-border (federated) mobility application; to the application of on land mobile technologies to improve data management on ships, all the way up to the piloting of a new value chains related to zero-emission shipping or electric aviation. The potential for scaling of these solutions differs with, for example, legislative/regulatory issues that require resolving (e.g. data sharing for NOMAD or safety rules applied to hydrogen powered lorries, etc.), while in other the challenge is to prove the business case to overcome a ‘chicken or egg’ type question (encouraging the first investments in new ships engines by proving the case for fuel supply, etc.).

Many of the projects have sought to use the NI funding to prove and communicate to a broad set of actors on what can be done today to move towards and contribute to the desired transition (mobility, preventative health, circular economy). As one interviewee noted: *“we decided to work on what can be done right now which means using available technology, test it and align it and combine knowledge from the portfolios of each partner and see how far we can go with today’s technology”*. Overall, given the volume of funding available, the position of Nordic Innovation can be viewed more as an intermediary supporting the implementation of innovation rather than the development. In technology readiness level (TRL) terms, this aligns with 6-7 and above so that rather than technology development, the focus is on demonstration of solutions in operational environments. This appears logical both in terms of the complementary with national (or European) R&D funding programmes as well as in terms of synergies with funding provided by NordForsk or Nordic Energy Research at Nordic level. Nordic Innovation is thus better positioned at the point in the system where the aim is speeding up deployment of technological or non-technological (e.g. business model) innovation at a Nordic level, by combining of solutions, resources or finance from national sources.

Developing Nordic policies and standards

In terms of policy development, the three programmes seek to build on Nordic strengths and policy priorities, however, the national specialisation in a field and the level of national policy development and priority for a topic tend to vary. The NSBT case study underlines that 1) the Nordic national circular economy strategies are in different phases; 2) the topic has different levels of priority in national



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policy; and 3) compared to other countries and institutions, some Nordics are at the front while others playing catching up. Similar observations can be drawn from the health and mobility programme cases where even if there is a common 'direction of travel', the existing regulatory framework (e.g. for data sharing or rules on emissions, etc.), the desired speed of change (deadlines for shift to emission free fuels) and the level of public-private investment varies at national level.

Interviewees stressed that Nordic Innovation should seek to capitalise on the knowledge generated via the programmes to make sure that businesses and public authority work together on regulations and decisions needed at both Nordic and national levels. There was a view that more could be done to give the project results visibility (including at ministerial level) and share methodology and ways of working, for example, *"to use the learning in other sectors such as agriculture or building industry with electrification of construction equipment"*.

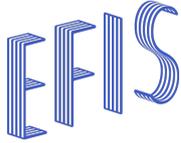
Several examples of the programmes delivering insights and evidence that develop or foster Nordic wide standards have been identified. A good example is the legal overview 'Bridging Nordic Data' prepared and published under the HDQL programme which being used across the Nordics to foster 'interoperability' given national legislative framework and the differing operational interpretations that can hinder Nordic wide developments.

At the broad political level, there is a proof-of-concept effect: *"it's coming, we are going to do it"*. The Nordic Innovation projects are viewed, by participants, as being able to send a positive signalling effect to the political level and help develop common frameworks that make taking decisions at national level easier, etc. This can include communicating on elements of the business model that nuance the high-level political goals, such as the need for phasing in of zero emission solutions during a transition period, or encourage a faster adoption of new sustainable solutions (e.g. electric aviation) which change not only business models but can potentially have a significant impact on quality of life in the Nordic region.

While Nordic Innovation cannot force national authorities to align strategies and policies, the intermediary role played by Nordic level in financing broad-based multi-stakeholder partnerships that are working to support 'system change' can be a powerful influence on and input to national policy development. For instance, the On-Shore Power Supply project will present their results in mid-September 2021 at a high-level conference in the Danish Parliament to get the political messages across which point out that the potential for switching from fossil fuel to renewable on-shore power supply is not a technological issue but one of regulation (zero-emission ports) and fuel vs electricity pricing frameworks. In the HDQL programme, the national identity and national priorities are important for adopting Nordic-wide initiatives nationally. The governments of each country need to focus on how to make data accessible but first they need to make sure that data is available. Hence, certain work still needs to be done nationally to prepare for Nordic co-operation.

International visibility of the Nordic Brand

The three programme areas were chosen as areas where there is already an established Nordic strength acknowledged at European and international levels. The programmes therefore sought to build on this perceived strength and help strengthen the international position or Nordic brand (e.g. for circular solutions). The performance targets sent in the grant letters refer to contributing to EU synergies for Nordic consortia and to creating value chain co-operation in Nordic and other markets with significant potential for Nordic companies. According to Nordic Innovation's Annual Report for



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2020: *“in all activities, Nordic Innovation has focused on the added value of Nordic co-operation in relation to EU co-operation and how Nordic co-operation can increase companies' opportunities to obtain funding from the EU. Especially in the NSMC programme, they have worked with consortia that have ambitions to use Nordic projects as a growth basis for EU projects”.*

In some cases, Nordic solutions being tested offer ‘first-mover’ advantages on global markets in areas such as green shipping or electric aviation; in others, they seek to build on the perceived Nordic model (e.g. in health care and health data, or in mobility data related to remote areas) to build a unique advantage that can both prevent the ‘big five’ bringing their business model to prevail and provide a basis for a Nordic solution to scale across the Nordic region and internationally. In both the green shipping and electric aviation examples, the Nordic model may be viewed as even ‘ahead of the curve’ in the sense that there is resistance from international bodies (IMO, etc.) to the type of more rapid change being pushed in the Nordic region to decarbonise. Being a front-runner can therefore be both an advantage and lead to some market resistance from incumbents at an international level.

The added value of the selected activities for the Nordic brand will be most evident if clear business investments follow through on some of the solutions, for instance, Norwegian ship-owners are driving demand for green ammonia powered ships and will not commit to buying ships before the engines and associated infrastructure are available. In such a field, the international market looks to the Nordics to see what is happening and ‘seeing is believing’. In normal (non-COVID) times, this would mean delegations from China, Canada, USA, etc. and vice-versa, e.g. via Nordic Innovation House that helps to reinforce the Nordic brand. Given this situation, much of this ‘brand positioning’ shifted online via webinars and many projects reported that they were able to maintain relations with international partners and use the events run or sponsored via the three programmes to reinforce their reputation as ‘front-runners’.

4. Conclusions and future options

4.1 Cross-cutting conclusions of the review

The review has assessed the three main programmes operated by Nordic Innovation during the period 2018-2021 addressing the four questions set initially. The findings should not be considered as a formal programme evaluation (addressing the classic evaluation criteria) or impact assessment, given the early stage of implementation of most of the actions during the first semester 2021 (and taking account of some delays / postponed actions due to the COVID-19 crisis). Rather the objective has been to draw lessons from the on-going programme implementation that can feed into the new programming period for which preparation has already begun in the form of eight new action plans adopted by the Nordic business ministers in line with the Vision 2030 strategy.

The table below presents a summary of the findings from the three programme case studies.

Figure 13: Traffic light review findings per programme (case studies)

Programme	What works well / positive impact (green)	Needs attention (yellow)	Urgent issues/risks (red)
Nordic Sustainable Business Transformation	NI has facilitated the connecting of Nordic stakeholders and helped catalyse and activate stakeholders to work on both Nordic circular ecosystem level and to develop and showcase practical circular business models for Nordic manufacturing.	A Nordic circular market requires overcoming a range of barriers that Nordic Innovation alone can address. Requires more political ownership at national level. Better define the role of the NCH as a means to operationalise the 2030 vision.	Greater transparency within the NCH project regarding funding flows and decision making (dissatisfaction, risk that partners leave)
Health, Demography and Quality of Life	Involvement of a broader ecosystem than classic healthcare stakeholders by applying an iterative process, which stakeholders understood and appreciated, and with Nordic Innovation acting as an intermediary	The communication and commitment around the 2030 vision should be showcased wider. Stakeholders across all Nordic countries need to be inspired and accept that the challenge is so big that the region cannot afford to have five different solutions.	Little is visible in terms of engagement of national funding in supporting and – more importantly – taking further the results of the NI funded activities.

Programme	What works well / positive impact (green)	Needs attention (yellow)	Urgent issues/risks (red)
Nordic Smart Mobility and Connectivity	<p>Challenge/mission driven approach providing 'directionality' towards system change and using calls for projects novel partnerships to test and demonstrate solutions.</p> <p>The larger consortia projects, driven by strong business partners, have helped drive systemic change agendas.</p>	<p>More emphasis on cross-project learning / project portfolio management by Nordic Innovation with a view to encouraging synergies and potentially expand the scale of the emerging value chains/ecosystems.</p>	<p>Stricter attention to Nordic value added of certain projects – avoiding “networking for networking” or projects piloting solutions that have limited scalable potential.</p>

These findings were presented and discussed during the policy learning workshop on 24 August 2021. The discussions and ideas generated at this workshop are integrated in the conclusions

Figure 14: Rose-Thorn-Bud discussion synthesis from the policy learning workshop

Rose-Thorn-Bud	Key conclusions
Rose – working well to retain	<ol style="list-style-type: none"> 1. The co-creation and flexible approach in programme design allowed an agile approach to the programme development. It is difficult to foresee what will happen from 2023- and beyond so while it is important to have a structured portfolio of actions there is a need for a flexibility that allows 'organic' growth. 2. The current programmes have succeeded in building or strengthening cross-border ecosystems (and platforms) have been created that utilise and build on Nordic wide knowledge. NI has been successful at nurturing the collaboration and supporting the emergence of these ecosystems and this should continue to be a priority. While some can survive without further public support, this doesn't mean that additional collaboration with them should be rule out.
Thorn – challenges to address	<ol style="list-style-type: none"> 1. Innovation projects will always seek market opportunities. Success is achieved when solutions are sold and implemented in a market. The public sector commitment must address this, or in other words, the issue is to create a market for Nordic solutions (public procurement etc). There should be clear indicators that support this commitment. 2. There is a risk of a fragmentation of activities due to the multifaceted planning process. Adopting an explicit mission-oriented approach could amplify this and this needs to be taken into consideration in future programmes.

Rose-Thorn-Bud	Key conclusions
	<ol style="list-style-type: none"> 3. Nordic Innovation should be careful not to promote ‘Nordic ecosystems’ that are ‘disconnected’ from the national ones, rather the focus should be on optimising the possibilities of the collaboration between national ecosystems to address Nordic level issues. 4. The experience shows that building Nordic cooperation leading to concrete projects/investments takes time – Nordic Innovation could be seen as one source of ‘patient capital’. The question of how to speed up the process is not yet fully resolved. 5. There remain difficulties in addressing (and managing expectations related to) national interests and ensuring Nordic added value. Demonstrating the latter remains a challenge.
Bud – future opportunities	<ol style="list-style-type: none"> 1. More work should be done to strengthen the ‘system intermediary’ role and functions that Nordic Innovation can play. 2. Raise further the level of ambition for Nordic ecosystems. The current period has underlined the value of the emerging (‘natural’) Nordic ecosystems that Nordic Innovation can work with to address challenges. The aim should be to optimise the contribution of the ecosystems to the Vision 2030 objectives, the EU missions, etc. 3. There should be a degree of continuity with the three ongoing programs in the implementation of the eight Vision 2030 action plans. This means building upon and developing even further what has already been achieved in terms of strong Nordic partnerships/collaboration structures and other activities.

Nb: Rose = A highlight or success. Thorn = A challenge or something on which there is need for more support. Bud = New ideas that have blossomed or something that should be developed further.

Based on the review, the following cross-cutting conclusions are drawn to inform the choice of instrument and policy process for the next generation of Nordic innovation programmes.

1. The **programme approach has worked effectively** in mapping and then mobilising new Nordic partnerships with the aim of contributing to the 2030 vision. As we recommended in the evaluation of the previous NCP, Nordic Innovation has operated Nordic Innovation as a ‘system optimiser’ building on national level investments and programmes for specific sectors/technologies/challenges and fostering cooperation on experimental policy solutions and instruments. This approach is based on the goals set at the political level (NCM) which are then translated into more operational objectives. Nordic Innovation plays a key role in scoping the level of national interest and existing national initiatives which can be drawn on when designing interventions that mobilise Nordic wide partnerships.

Different approaches have been tested across the three programmes with the NSMC adopting a challenge or mission-oriented approach while the NSBT and the HDQL have developed a portfolio of related actions around a core central theme. Nevertheless, there remains room for improvement notably in terms of cross-project/programme linkages and knowledge exchange and a shared understanding of how the portfolio of projects/instruments is contributing to achieving the overall objectives (Vision 2030).

In the future, the challenge will be to maintain the effective implementation of a programme approach given the number (eight) of actions proposed by the EK-N. The eight action plans give a stronger focus to missions underlying the need for Nordic Innovation to further strengthen the role as an intermediary bringing together national mission partnerships (and respective national policies) and business ecosystems and supporting the strategic positioning of the Nordic region with respect to EU missions and agendas (further developed in the next section). The aim being that Nordic cooperation is complementing, not running in parallel to, national policy agendas.

2. **National anchoring** is a core principle of Nordic Innovation's operations as there is a need to ensure a balanced contribution and participation of all Nordic countries during the programme implementation and to sustain impact post NI intervention. This requires national anchoring on an on-going basis that goes beyond an initial check on priorities. In the period reviewed, the involvement of national stakeholders in the programmes varied given the specialisation in specific topics as well as the national priorities, this resulted in uneven participation in and 'commitment' to the activities (missions). The larger number of 'actions' chosen for the next period may further reinforce a variable geometry of involvement across the Nordic countries. Ideally, a priority should be given to ensuring that stakeholders from all countries are involved in the implemented actions to optimise Nordic wide impact (added value).

During the policy learning workshop, it was stressed that that anchoring is should not only occur at the beginning of the programme cycle and takes several forms. The Nordic Innovation programme method has been relatively successful in building on the political priorities set by the Nordic Council of Ministers and EK-N by mapping and confirming the interest of national stakeholders in the proposed programmes. This is a first step in and a first 'high-level' of anchoring by confirming that the political goals are matched by an interest of national stakeholders to work together on specific challenges at Nordic level. The 'political anchoring' at the beginning of the programmes needs to be then matched by 'policy anchoring' i.e. commitments by national ministries or agencies, particularly the innovation agencies, to co-finance or ensure effective synergies between their own programmes/instruments and the Nordic level intervention; and, thirdly, operational anchoring, i.e. co-financing by the participants of a share of the project costs. At both the policy and operational levels, a willingness to put 'money' (or time/resources) on the table is a key indicator of national stakeholder commitment to Nordic co-operation. A key success indicator for Nordic Innovation's intervention is the extent to which national policy agencies and stakeholders commit to further funding or development of the partnerships, initiatives and ecosystems at Nordic level beyond the end of a programme cycle. This implies that Nordic Innovation should maintain 'communication channels' open during the programme cycle and promote the value of the emerging results to encourage follow-on funding from other parties.

3. **The mix of instruments applied was generally appropriate and while it is still too early to talk about 'real impact', there are promising results emerging in each programme:** Most of the projects / interventions require some form of on-going support to ensure that the initial 'investment' leads to sustained impact. This implies both a potential for continuity between programme periods at Nordic level and a need for exit strategy (business plan, etc.) / continuity planning (mobilising public-private resources) for the partnerships and emerging Nordic ecosystems funded for a specific time by Nordic Innovation.

The programs experimented with different mixes of instruments adapted to the topic and goals. Calls for projects in two-stages were used effectively by the NSMC program to source and test a range of different solutions to mobility challenges. The two other programs developed (in a more or less structured manner) a 'portfolio' of projects that combined different types of instruments to address the set goals.

A (larger) project can potentially combine a number of specific instruments to achieve its goal while a group of inter-linked (smaller) projects can be deployed by a set of instruments that together deliver on a common goal. Both approaches are valid but require different degrees of steering (intervention) from Nordic Innovation. In other words, there is a need to strike a balance between ecosystem building (bringing together the elements to support a 'system innovation') versus piloting a portfolio of possible 'competing' solutions, while avoiding funding pilots with limited scaling potential. Moreover, in the future, there should be an increased focus on tackling regulatory and procedural barriers in a harmonised way across the Nordic region to enable scaling (e.g. in the data field).

4. **Nordic added value** has been generated in at least four ways: building a strong Nordic internal market; demonstrating Nordic wide solutions by bringing together players with elements of a broader solution, encouraging Nordic regulatory and policy alignment and strengthening Nordic Branding at global level. The findings of the review suggest that in terms of Nordic added value Nordic Innovation's intervention should not focus on lower level TRL projects, this is well covered by national level R&D and innovation instruments or by other Nordic agencies interventions. Nordic Innovation adds real value when it focuses on facilitating the combination of emerging solutions, technologies and business models from national level to help deploy them or bring them to implementation on a Nordic level (Nordic market or Nordic European and global positioning). In this space, Nordic Innovation is essential in instigating and encouraging the formation of partnerships that have a Nordic dimension. The relatively limited funding is critical a means to 'oil' the co-operation amongst Nordic actors who individually have elements of the required solution. Often no other funding available for Nordic wide projects. The Nordic Innovation support can also provide the means to prove and communicate at a Nordic level to a broad set of actors about what can be done today to move forward and contribute to transition. This inspirational role should close a feedback loop from Nordic level programmes built on national interests with the results of the intervention feeding back down and further encouraging national actors to invest and co-operate in each field to jointly achieve national and Nordic goals.

4.2 Nordic Innovation - an intermediary for mission-oriented innovation policies

The interventions funded and supported by Nordic Innovation fit the trend towards mission-oriented innovation policies (MOIP). The OECD has reviewed examples of MOIP and proposed a definition :

A mission-oriented innovation policy is a co-ordinated package of policy and regulatory measures tailored specifically to mobilise science, technology and innovation in order to address well-defined objectives related to a societal challenge, in a defined timeframe. These measures possibly span different stages of the innovation cycle from research to demonstration and market deployment, mix supply-push and demand-pull instruments, and cut across various policy fields, sectors and disciplines⁷.

The OECD work identified four main types of MOIP, summarised in the following table. A MOIP initiative may contain elements of several different types.

Figure 15: Four types of mission-oriented innovation policy

Type	Leadership	Missions	Examples
Overarching mission-oriented strategic frameworks	<ul style="list-style-type: none"> Center of government High-level committee 	<ul style="list-style-type: none"> Multiple missions or mission areas Pursuing ambitious challenges Long-term horizon 	<ul style="list-style-type: none"> Horizon Europe's missions (EU) Mission-driven Topsector and Innovation Policy (NL) High Tech Strategy 2025's missions (DE) Moonshot R&D Program (JP))
Challenge-based programmes and schemes	<ul style="list-style-type: none"> Agency 	<ul style="list-style-type: none"> Focused Seeking acceleration of (most often technological) innovation Mid- to long-term horizon 	<ul style="list-style-type: none"> Pilot-E (NO) Industrial Strategy Challenge Fund (UK) The Genomics Health Futures Mission (AU) Science Foundation Ireland's Innovative Prize (IE)
Thematic mission-oriented programmes	<ul style="list-style-type: none"> Ministry Agency 	<ul style="list-style-type: none"> Focused on competitiveness in the research consortia of the 1980s – 1990s Mix of societal and competitive challenges in current programmes 	<ul style="list-style-type: none"> VLSI (JP) USABC (US) Mobility of the Future (AT) Building of Tomorrow/Cities of the Future (AT)
Ecosystem-based mission programmes	<ul style="list-style-type: none"> Ministry Agency 	<ul style="list-style-type: none"> Innovation agenda developed by the innovation actors themselves, with neutral support from public authorities 	<ul style="list-style-type: none"> SIP (SE) Vision-Driven innovation milieus (SE)

Source: Larrue (2021)

Nordic Innovation's support during the period reviewed in this report mixes elements of a challenge based MOIP with an ecosystem-based mission and the eight new action plans adopt a 'mission-oriented' language.

Based on the analysis of national MOIP policies, the OECD work has developed a useful framework structured around three dimensions (see Figure 16).

⁷ Larrue, P. (2021), "The design and implementation of mission-oriented innovation policies: A new systemic policy approach to address societal challenges", OECD Science, Technology and Industry Policy Papers, No. 100, OECD Publishing, Paris, <https://doi.org/10.1787/3f6c76a4-en>

Figure 16: Dimensions of MOIP

MOIP dimension	Questions addressed	Corresponding features in the MOIP design principles
 Strategic orientation	How to engage a wide group of stakeholders in the mission definition?	Legitimacy
	How to define missions in MOIPs?	Directionality, Intentionality and flexibility
 Policy co-ordination	How to coordinate policy bodies across silos and levels of government in MOIPs?	Horizontality, Verticality and Intensity
	How to coordinate policy bodies to foster exploration and produce novel solutions?	Novelty
 Policy implementation	How to integrate consistent bundles of instruments in MOIPs?	Policy mix consistency
	How to maximise the participation of public and private partners in MOIPs?	Fundability
	How to evaluate and learn from MOIPs' implementation?	Evaluability and Reflexivity

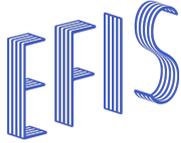
Source: Larrue (2021)

We apply this framework to discuss the existing and potential future role of Nordic Innovation in designing and implementing MOIP type interventions.

Strategic orientation

As discussed previously in this report, the strategic orientation of Nordic Innovation's programmes are set at a high political level based on the Nordic Council of Minister's priorities (Vision 2030, NCP, etc.). This provides a degree of 'political legitimacy' and 'directionality' to the work done by Nordic Innovation, however, as noted above, these goals are very broad and need to be operationalised to become effective. The process of mapping national stakeholder interest and priorities carried out at the beginning of the programme contributes to a bottom-up legitimacy for the programmes and orientations. It is in line with approaches, such as the Strategic Innovation Programmes in Sweden, where partners are engaged in the definition of projects. In addition, the engagement of users in certain projects is another means of ensuring the funded activities are based on demand or identified needs. These types of process have been critical in providing more granularity to the high-level political goals by defining more precisely the areas where Nordic level intervention can add most value to achieving the desired transformation. They also provide to some extent more 'intentionality' or in other words specific and well-articulated needs-based goals with clear timelines and milestones. In the case of the Nordic Innovation programmes, the contracts with the project participants set out expected results within a specific timeframe, however, they could be more clearly embedded in the overall 'mission goal', i.e. rather than just defining end of project results, explain more clearly the contribution to meeting the mission goal taking account of the fact that a single project or intervention will not by itself usually be sufficient.

Finally, a core feature of MOIP is flexibility meaning the targets and means of interventions to meet them can be revised at different stage of the process when needed. The flexibility feature recognises the experimental and 'risky' nature of the intervention and the need for both the participants and the



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implementing agency to be open to adjusting the expected details. During the programme period, Nordic Innovation has shown due flexibility given the COVID crisis and has worked closely with partnerships when required to redirect activity or means. This ‘hands-on’ support is appreciated and should be maintained in the future.

Policy coordination

Four key principles or features are identified within the policy coordination dimension of MOIP: horizontality, verticality, intensity and novelty. Within the framework of the NCM agenda, Nordic Innovation’s interventions seek to achieve Nordic level goals by building upon national priorities and initiatives. The intervention funded by Nordic Innovation may be dependent upon or conditioned by national (Nordic) or EU level policies and instruments (financial, regulatory, etc.). In the Nordic policy space, Nordic Innovation has sought to ‘provoke ideas’ and to ‘be disruptive’ to identify and initiate Nordic level co-operation that drives transition and system change in the medium to long run. The concept of a system transformation requires the application of a set of process orientated instruments that span not only funding but also regulatory change (regime change) and the mobilisation of resources at each stage. This suggests the need for a clearly defined framework where the inputs of different policy actors at different levels can be orchestrated.

Horizontality means that the plans and activities of policy bodies covering different policy fields are coordinated to achieve the mission. In the framework of Nordic Innovation’s programmes this can be thought of in several ways: first of all, co-operation and joint actions with other Nordic agencies (NordForsk, etc.) or with other initiatives funded at Nordic level. Secondly, the need to ensure that national stakeholders mobilised in support of the programmes are ‘cross-departmental’. During the current period, a degree of horizontality has been present in certain actions at Nordic level. Equally, while the ‘natural’ partner of Nordic Innovation at national level are the innovation agencies, Nordic Innovation has also sought out co-operation with other national bodies in the thematic fields. To some extent, the co-operation with innovation agencies at national level, even if they are represented on the Nordic Innovation board, could be stronger and more structurally organised during the implementation of programmes.

Verticality is defined as ensuring the plans and mission of policy bodies at different level of government are coordinated to achieve the mission. For Nordic Innovation this implies obviously co-operation with national authorities and stakeholders which, as described in the case studies, has been based on a mapping of key players and mobilisation through various instruments. Verticality also implies co-operating with and aligning actions in search for synergies with EU or other international bodies (e.g. in fields such as aviation or maritime) policies and agendas. The EU’s Horizon Europe programme missions provide an opportunity for the Nordic region to position itself so as to ensure Nordic know-how and capacities are integrated in an optimal manner. Nordic co-operation can help prepare the ground for Nordic organisations to participate at EU level. The European Institute of Innovation & Technology (EIT) knowledge and innovation communities (KIC) are another example of European wide partnerships’ where Nordic partners play important roles. For EIT Health Scandinavia mobilises leading triple helix health organisations from Sweden, Denmark, Finland and Estonia to work jointly on topics such as innovative use of data in healthcare. For Nordic Innovation to play a complementary role in a ‘crowded field’ requires careful selection of specific ‘niche’ in which there is an additional need for Nordic co-operation or an integrator role ensuring that all Nordic national resources are incentivised to become involved in EU level actions.

The second two principles are harder to ensure at a Nordic level: intensity (that decisions regarding the intervention) are taken collectively and are binding on the involved policy bodies) and novelty (the plans and activities of different bodies are co-ordinated, e.g. via a portfolio approach, so as to cover and experiment various alternative solutions). Within the framework of the Nordic Innovation programmes and the use of the available funding from the NCP, both these principles have been applied to the ‘portfolio’ of action funded. However, it is more difficult for Nordic Innovation to ensure binding commitments from national agencies or to fit Nordic Innovation interventions into a broader portfolio (spanning related and complementary funding or other interventions) from national or supra-national (EU, etc.) programmes that could potentially contribute to the overall mission. For instance, novelty can be ensured by not only selecting individual projects based on their intrinsic quality but for their potential contribution to a consistent portfolio of activities that together will achieve a mission. A shift to ‘joint programming’ with national agencies or a more explicit link to EU level missions and initiatives may help strengthen the intensity and novelty of the policy coordination.

Policy implementation

Ensuring the consistency and effectiveness of the modes of intervention and resources of the public and private partners mobilised to achieve the policy objectives. Four key principles apply to policy implementation: policy mix consistency (diverse and consistent set of policy intervention), fundability (resources are committed to the achievement of the mission by all stakeholders), evaluability (clear evaluation framework, indicators and processes to learn from implementation and assess progress towards the mission goal) and reflexivity (evaluation is used to inform decision making on changes required to achieve the mission).

In terms of the policy mix consistency and fundability, at national level, *“the bulk of MOIPs build upon the existing policy instruments operated by the participating ministries and agencies”* (Larrue, 2021). Unlike a national agency, Nordic Innovation has a limited capacity (in terms of budget and scope of action) to intervene and operates at a multi-country level. To date, Nordic Innovation tends to develop a tailored portfolio of own instruments to implement the thematic programmes. While there may be co-operation with other Nordic agencies (e.g. Nordforsk and Nordic Energy for the Nordic Green Growth Research and Innovation Programme), the thematic programmes have been largely delivered through a mix of instruments funded by Nordic Innovation. Involving national agencies in (part-)funding interventions at the Nordic level has proven relatively difficult despite the process of programme design confirming national interest in the themes. This may reflect that Nordic level actions are viewed by the national innovation agencies as a ‘plus’ (‘nice to have’) rather than as part of the core intervention logic of their own agendas. In other words, a shared policy goal is a necessary but not a sufficient condition for aligning interventions or developing joint actions. As an example, if Nordic Innovation provides an environment in which Nordic wide partnerships can examine the feasibility of various solutions and pilot their application, national agencies could provide funding for scaling up via test-beds or demonstrators or for roll-out on a Nordic level. However, this needs to be planned from the beginning of the cycle if all parties are to intervene at the right moment.

Evaluability and reflexivity go hand in hand. The current review has underlined that the theory of change models remained generally too vague in terms of the way in which the activities funded by Nordic Innovation could contribute to meeting medium term objectives set at Nordic level. A greater degree of precision in what the interventions funded can reasonably achieve in 3-4 years (or less) and how they fit within the overall portfolio of interventions aimed at achieving the mission goal would be

beneficial. At the same time, as the OECD note “Overarching mission-oriented frameworks, are more challenging to evaluate due to their scale, scope and nested structure (system, sub-system, projects). The Nordic Innovation programmes are relatively ‘small’ in terms of funding volume but are no less complex to run than larger programmes. The hands-on approach and open dialogue with the programme participants is time consuming and over-formalised evaluation or monitoring processes may lead to ‘death by indicators’ or over burdensome reporting that threatens the motivation of participants.

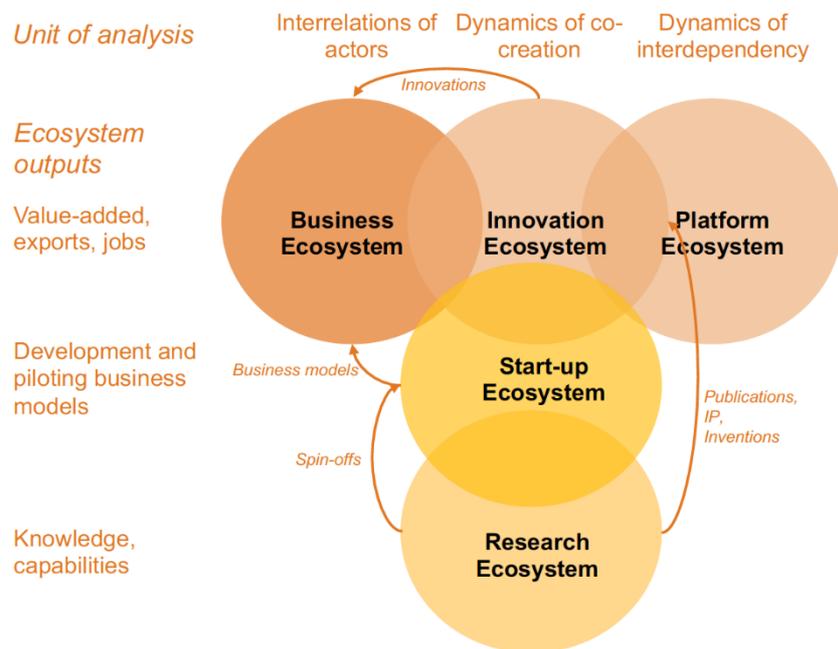
In this context, we make the **following recommendations** for the period 2021-2024:

1. Most MOIP initiatives cover a medium-to long term perspective and the NCP 3–4-year programme cycle appears to be too short to expect significant results to be achieved at a Nordic level. The need for continuity on mission topics (but not necessarily on who is funded to do what) and ecosystem building seems paramount. In some cases, this may imply follow-on support for specific ‘projects’, in other it may mean building on the results of 2018-2020 but with a new set of activities.
2. The eight new action plans cover a broad range of topics with broad goals and objectives that are likely to prove ‘over ambitious’ and for which impact will be difficult to track. There is a risk of a fragmented effort that will not yield tangible results on a scale required. Several of the topics can be considered inter-related and should be developed as sub-themes of 2-3 broader mission programmes.
3. The need to place Nordic Innovation’s intervention within a context of other national and European challenge/mission policies is evident. The mapping process as undertaken at the beginning of the 2018-2021 period is an essential step but could be further elaborated into a share roadmap where Nordic and national agencies commit to contributing to different steps and inputs required to meet the mission objectives. This would help place the
4. The evaluation and monitoring process should be developed through a more participatory approach that would encourage all programme participants to define their contribution and place it in the context of the overall mission objective. The high-level political goals set at the Vision 2030 level need to be made operational and realistic targets (within set timescales) for each programme/action plan set and clearly communicated. Funded projects/partnerships should be expected to explain their contribution to meeting that target in terms of verifiable metrics (a mix of quantitative and qualitative). The case studies have proposed alternative indicators for the current programmes which provide a better framework for monitoring progress towards the expected goal.

4.3 Fostering and sustaining innovation ecosystems at Nordic level

The ecosystem concept was used in programming documents and by interviewed participants to describe efforts to build new or reinforce existing alliances across the Nordic region. In the literature several types of ecosystems ‘co-exist’ as illustrated below.

Figure 17: Different types of ecosystems



Source: Piirainen et al (2020) Impact Study: World-class Ecosystems in the Finnish Economy, Part A.

Some common characteristics for ecosystems include:

- Global and inter-regional nature
- Blurring of industry and sector borders
- Dynamic interaction and co-opetition
- Common goals, interests and values
- Self-directing and regulating, distributed responsibilities and decision-making
- Open knowledge exchange
- Adaptability to new environments
- End-users/customers have an active part in value creation

Several funded projects and partnerships exhibit characteristics such as an emphasis on new cross sectoral/industry alignments (smart city technologies for maritime solutions) or distributed responsibilities and open knowledge exchange. In the NSMC programme, the need to involve a range of actors, from energy providers, port authorities to ship owners, in a collaborative co-creation process was emphasised.

What is the future role for NI in the creation of Nordic innovation ecosystems?

Innovation ecosystems facilitate the collective generation of system-level outputs, in the sense that the heterogeneous community collectively generates an output that is greater than any single participant could deliver alone⁸. This is an important point to keep in mind when assessing the results of NI funded projects. Adding the temporal factor here to ‘beef and speed up’ the process to ensure achieving the Vision 2030. **NI plays an important role in this by facilitating that the conditions are in place to get best possible outcome.** How NI can best support respective ecosystem depends on the characteristics of the ecosystem, its primary goals, purposes and activities.

Developing and testing a new technology, e.g., green ammonia powered shipping, is thematically more specific and involves fewer numbers and types of stakeholders, while the development and implementation of new processes or systems across society will include a wider range and number of stakeholders across segments and sectors, e.g., transition from a linear economic model to the implementation of circular business models in companies. An ecosystem that involves a wider range and numerous stakeholders, also runs a higher risk of not including relevant partners and loose relevance and represent the needs and wants of a larger group. For instance, how can SMEs be represented in NCH in a way that they have a voice that counts? Inviting industry or business associations which have a more collective mandate can be a way forward.

NI could play an active role here and recommend to the existing ecosystem participants to invite stakeholders that are ‘missing’, or NI itself as a ‘neutral’ recognized Nordic player could invite key stakeholders, ensuring that the ecosystems are optimized in terms of representation, thinking in terms of value chains? Other stakeholders that may not seem to be obvious as candidates for the ecosystem could also be invited, like university research groups or capital and finance, the latter can be important for an **exit strategy** going to the market for instance. Considering these final steps from the beginning can have an important effect on how the project is organized and managed. According to MIT there are five key stakeholders critical to the success of most efforts at innovation ecosystem creation and growth⁹. Which stakeholders are needed depends of course on the character and objectives of the ecosystem (see Figure 18).

To address the market and capital access for Nordic companies transitioning into circular economy, there is the ‘Kreutzer report’ on green growth (Kreutzer, 2018)¹⁰ from the Nordic Council of Ministers. While the topic is relevant in general to circular transition, many of the recommendations in the report, with some adaption, can be applied to make Nordic CE ecosystems more sustainable. For instance, the recommendation “the Nordic prime ministers are encouraged to communicate their common ambitions to create a Nordic, world-leading ecosystem ... and to develop an action plan based on the study’s recommendations.” (p.8). Instead of the recommendations coming from a study they could come from a Nordic CE advisory board in a similar way the Danish **advisory board for**

⁸ Thomas, L. D. W., and E. Autio (2019), “Innovation ecosystems”, Oxford Research Encyclopaedia of Business and Management. Aldag, R. (Editor). UK: Oxford University Press

⁹ https://innovation.mit.edu/assets/MIT-Stakeholder-Framework_Innovation-Ecosystems.pdf

¹⁰ Kreutzer, I. (2018). An integrated and effective Nordic ecosystem for innovation and green growth - A closer look at access to risk capital in the Nordic countries. Copenhagen: Nordic Council of Ministers. doi:10.6027/ANP2018-814

circular economy prepared recommendations for the Danish Government¹¹ or Sitra’s recommendation to the Finnish government to set up a multidisciplinary **circular economy steering group** with an official status. NordForsk has programme committees with representatives from the participating funding organizations. The Nordic CE advisory board should include representatives from the national government and or innovation agencies to create a direct link between ‘needs’ of the Nordic CE ecosystem and support measures on the national level¹².

Figure 18 : Five key stakeholders critical to the success of innovation ecosystem creation



Source: MIT Innovation initiative (2019)

National support, or national ‘buy-in’ for Nordic initiatives, was one of the recommendations in the previous programme evaluation (Reid & Varga, 2016) – “*The Nordic Innovation board should ensure that the relevant ministry or agency in each country is committed to the actions being taken forward ... and that a clear ‘business model’ (what resources are being mobilized by national partners, in return for what result) is spelt out and approved by all participants prior to committing Nordic level funding*”. As one of the seven key lessons, Sitra lists in its toolkit for creating a circular economy road map is to **secure broad commitment and encourage ownership of the process across all stakeholders** (companies, government, civil society and individuals) for the change to take root and grow. It is not enough that there is a Vision 2030 or that Nordic countries have national CE strategies if it’s not promoted as a “key governmental project” through “continuous and cross-administrative strategic activity” (Sitra, 2019)¹³.

NI can **fund or conduct own studies or reviews of existing reports and work done at the Nordic level** to cover issues like bottlenecks, tools, strategies, opportunities, best practices, etc. These could provide indication 1) where promoting a certain ecosystem would be useful; 2) what has already been done at Nordic level to avoid duplication; and 3) where there are gaps in national support activities and room for improvement. For instance, bioeconomy has a clear role in Finland’s national circular economy strategy, is there a potential for other Nordic countries to support this sector? NI could

¹¹ https://en.mfvm.dk/fileadmin/user_upload/MFVM/Miljoe/Cirkulaer_oekonomi/Advisory-Board-for-Circular-Economy-Report-2017-Content_Single_pages_WEB.pdf

¹² <https://www.sitra.fi/en/articles/circular-economy-actions-also-needed-finland/>

¹³ <https://www.sitra.fi/en/articles/circular-economy-actions-also-needed-finland/>

advocate for an ecosystem in a certain field or linkages between different ones and indicate to national governments the potential. NI should also tap into and follow work done by relevant national expert groups, for instance at the time of writing there is an expert group in Sweden on what instruments are needed, to be removed or changed in order for SMEs to be able to more easily and more efficiently transition to circular business models and scale up existing ones¹⁴. A good example of this type of activity taken up by NI is the Finnish Circular Economy Playbook for Finnish SMEs that served as inspiration for the Nordic Circular Economy Playbook. NI's role could be to feed knowledge of this type to the ecosystems and national governments and agencies to strengthen the contextual framework for ecosystems.

Linkages and alignment should be made to activities on European level, with the EU Green Deal and the Circular economy action plan (CEAP), align ecosystem focus areas to find synergies and optimize the potential to access EU funding in relevant areas. For example, under the Sustainable and Smart Mobility Strategy action area of the Green Deal, an example would be to promote an ecosystem around electric vehicles (EVs), there are several activities and established companies across the Nordic region that are related to EVs, battery technology for EVs, and EV battery recycling. In 2017 the EU under EIT InnoEnergy launched the European Battery Alliance (www.eba250.com) to establish a competitive and sustainable battery cell manufacturing value chain in Europe. At Nordic level there is for example, Volvo/ Polestar (EV), Northvolt (batteries) and Hydrovolt (battery recycling). A source is the European Cluster Collaboration Platform (ECCP - <https://clustercollaboration.eu>) that offers access to a map of industrial clusters and partners and includes the classification by actor, industry and region. of **industrial priority areas identified by the EU (industrial alliances and ecosystems)**.

One important issue is how to **monitor and measure progress**, how to know if an ecosystem is headed in the right direction. What defines success and how can it be measured? In the case of Vision 2030, how well are the NI projects and activities contributing towards this vision? Once it is known what to measure, the appropriate **indicators** can be selected and an ecosystem can receive, achievable, targets that define success. These could be developed in cooperation between NI, bringing the mission statement for the ecosystem, and the ecosystem stakeholders who understand their sector(s) and segments involved. Type of relevant indicators depends on the characteristics of the ecosystem as well as where in the maturity/ innovation phase it is. One general indicator that could be used is to measure what the cost is of 'doing nothing' (Lindegaard, 2016)¹⁵. Another interesting indicator suggested by Lindegaard, and could also be applied across all ecosystems, is the '**Ecosystem happiness**'. The presumption is that partners are important for innovation success, hence managing expectations is important, ensuring that the organization is open, transparent, targeted and adaptive to the arena where the ecosystem is active. Further inspiration can be taken from the Eco-innovation Scoreboard and Index¹⁶, with indicators related to inputs, activities, outputs, resource efficiency outcomes and socio-economic outcomes. While not all indicators can be taken one-to-one as it depends on what type of ecosystem it is, a mix of soft indicators, like satisfaction of stakeholder ('happiness'); and hard indicators can be used, for instance how many cities are part of an ecosystem of climate neutral cities in comparison to how many there are of a certain size in the Nordic region. Important is to always set a benchmark to define the level of success.

¹⁴ <http://www.cradlenet.se/expertgrupp-styrmedel-fr-sm-och-medelstora-fretag>

¹⁵ <https://innovationmanagement.se/2016/09/29/metrics-open-innovation-ecosystems/>

¹⁶ https://ec.europa.eu/environment/ecoap/indicators/index_en

The role NI's can take in this overall framework is to be the '**system optimiser**' (Reid & Varga, 2016), stimulate the development of Nordic ecosystems in specific market segments and sectors in line with national CE strategy focus, and that also have a relevance on a European level, and identify challenges and foster cooperation. Once these ecosystems have started, NI could play a supporting role ensuring that relevant stakeholders are represented, that systems are working well and link or inform about other NI and European, activities that are taking place in other ecosystems (see Figure 20 for mapping), support the creation of ecosystem of ecosystems where relevant. Connecting relevant stakeholders calls for **continuous alertness**, instead of a single moment of analysis. Hence, keeping an eye on the needs in an ecosystem and the stakeholders: do they need additional information? Do they need 'guidance' in terms of organization? Are all stakeholders in the value chain represented? Are new stakeholders needed to make or speed up progress? A good example was the implementation of a project manager in NCH on request from the NI to introduce structure in the organisation.

"Establishing organized interactions will favour the continuity of the ecosystem, which should be settled on trust, sharing, and a meaningful sense of identity that will consolidate the network based on shared values, which will enhance sustainable practices."
(Costa & Matias, 2020)¹⁷

As mentioned above, taking into consideration from the start which key stakeholders should be included has an impact on the **exit strategy**, as it must be planned and implemented together from the beginning. This helps to:

- Increases chances of the project/ ecosystem to achieve better and sustainable results.
- Clarifies roles of each stakeholder.
- Clarifies the project/ ecosystem planning and the possible planning of follow-up projects.
- Reinforces the commitment of stakeholders to the project/ ecosystem.
- Increases the ownership of the project.

As a guidance for planning an exit strategy, one could use following questions:

- What should an exit strategy accomplish? What activities and results of the project/ ecosystem should be maintained once it is over? How well do they line up with the objectives (e.g., of the funding activity, Vision 2030 ...)
- What exit strategy will be followed in the project/ ecosystem? Is there a role for NI in it?
- What are the reasons for closing the project/ ecosystem?
- What early measures are required in the project/ ecosystem to ensure that the objectives of the exit strategy shall be achieved?
- Who (partners, stakeholders) should implement actions and when (utilising the stakeholder analysis)?
- What are the indicators, monitor actions and results of the exit strategy?
- Who monitors the indicators and when?

The answers to the questions above can be recorded in a matrix available to all involved stakeholders and can indicate where NI plays a role.

¹⁷ <https://doi.org/10.3390/su12198112>

Figure 19 : Matrix for exit strategy response

ACTIVITY	WHO implements the action?	WHEN should the action be implemented?	HOW is the implementation monitored? WHAT benchmarks will be used to monitor the activity?	WHO is monitoring and when?	[WHAT is the cost of the activity?]
1.					
2.					

Source: Gardner, Greenblott and Joubert (2005) *What we know about exit strategies*

While the recommended activities above are made with a circular economy (NCH ecosystem) in mind, many of the ideas are applicable to any ecosystem as they include ideas from two models, Industry 4.0 and Open innovation, creating the concept of Open Innovation 4.0, a tool to faster address and with higher impact tackle societal challenges by enhancing the innovation process through more broad and strategic collaborations across boundaries (silos) together with the power of emerging and digital technologies. It creates more flexible and adaptive organizations, allowing for the combination of internal resources with the external co-operators (Costa & Matias, 2020). These types of new partnerships together with digitalization are important in boosting the circular economy and contribute to the sustainability transition, hence towards Vision 2030.

Figure 20 : Mapping existing relevant activities and work - example

	NI	NCM	Nordic countries	Europe	Global
1. <i>Published work, tools, guides, etc.</i>	Nordic Circular Economy Playbook	<ul style="list-style-type: none"> - Towards sustainable consumption in the Nordic Region; - Enabling the Digital Green Transition: A Study of Potentials, Challenges and Strengths in the Nordic-Baltic Region; - Policies for the promotion of BECCS in the Nordic countries 	FI: Circular Economy Playbook for Finnish SMEs	Eco-innovation country reports, Eco-innovation scoreboard	Ellen MacArthur Foundation, WEF, IMF, IEA, WTO - Environmental Data base
2. <i>Relevant stakeholders</i>	Board	EK-N	Confederations that represent SMEs; National ministries, innovation agencies	EU	Ellen MacArthur Foundation, OECD

	NI	NCM	Nordic countries	Europe	Global
3. <i>Platforms, networks, ecosystems</i>	NCH	Nordic Network for Media and Communication Ethics	DK: State of Green;	European Circular Economy Stakeholder Platform (ECESP), Holland Circular Hotspot, EIT-KICs ...	WCEF, PACE, Climate Action Platform (WEF), Shaping the Future of Energy, Materials and Infrastructure (WEF)
4. <i>Relevant programmes, projects and activities</i>	Nordic Smart Government (simplify the lives of SMEs and to create new business opportunities and growth based on economic data)	- Nordforsk - <i>Nordic Bioeconomy Programme</i> ; - Nordic Innovation, NordForsk and Nordic Energy Research: <i>Nordic Green Growth Research and Innovation Programme</i>	The Danish Eco-Innovation Program	C-VoUCHER (supported by H2020), CIRC4Life (supported by H2020)	
5. <i>Policy focus areas, strategies</i>	Programming periods	Vision 2030, Policy Areas, Presidency	DK, FI, NO, SE - CE strategies	EU Green Deal, Dutch CE strategy	UN SDGs. IMF. IEA
6. <i>Funding</i>	NSBT, NSMC, HDQL, ...	Nordisk Energi forskning	Danish Eco-innovation subsidy scheme (MUDP)	Horizon Europe: Pillar II, EIT, EIB	

Annex 1 : Projects and project partners per programme

Nordic Smart Mobility and Connectivity		
Module:	Project:	Project partners:
Quality of life through Nordic Smart Mobility + Clusters as Drivers of Nordic Smart Mobility	<i>Nordic Open Mobility and Digitalisation (NOMAD)</i>	Kyyti Group Oy (Project Lead), ITS Norway, ITS Finland, ITS Sweden, UbiGo, Capital region of Denmark, RISE and TØI
	<i>Nordic Network for Electric Aviation (NEA)</i>	RISE (Project Lead), Heart Aerospace AB, El-Fly AS, SAS Scandinavian Airlines, Icelandair, Air Greenland, NISA, Finnair, BRA, Swedavia, Avinor, Finavia.
	<i>The Connected Ship</i>	MDC (Maritime Development Center) (Project Lead), Mobile Heights, VASEK, SMTF, Sensative AB, Beijer Electronics A/B, Accelerated Growth A/B, Sea IT, Life Finder, Maersk Tankers a/s and Wärtsilä
	<i>Next Nordic Green Transport Wave - Large Vehicles</i>	Norwegian Hydrogen Forum (Project Lead), Hydrogen Sweden, Icelandic New Energy, Hydrogen Denmark, VTT- Tech. Research Finland and Kunnskapsbyen Lillestrøm
Sea Meets Land	<i>Zero Emission Energy Distribution at Sea</i>	Wärtsilä (NO og FI); Aker Solutions (NO); DFDS (DK); Grieg Star (NO); Kværner (NO); Equinor (NO).
	<i>Nordic Green Ammonia Powered Ships</i>	Global Maritime Forum (DK); Lauritzen-Kosan (DK); Yara (NO); Wärtsilä (FI); MAN Energy Solutions (DK); DNV-GL (NO); Ørsted (DK); Danish Shipping Finance (DK); DNB (NO).
	<i>Onshore Power Supply in the Nordic Region</i>	Partnere: Danish Maritime (DK); NCE Maritime Cleantech (NO); Powercon (DK); SSPA (SE); Danske

Nordic Smart Mobility and Connectivity		
Module:	Project:	Project partners:
		Havne (DK); World Maritime University (SE); Danfoss Drives (DK).
	<i>Maritime Energy Transition</i>	Renewable Energy Cluster (NO); RISE (SE); VASEK (FI), Erhvervs hus Fyn (DK)
	<i>New Offshore Wind Ports in the Nordics</i>	Energy Innovation Cluster (DK); Norwegian Offshore Wind Cluster (NO); Offshore Väst (SE); Roenne havn (DK), Karlsund havn (NO), Trelleborg havn (SE).

Nordic Sustainable Business Transformation		
Module:	Project:	Project partners:
New Solutions	<i>LOOP Ventures for the Circular Economy</i>	Antrop (SE), AGENS (NO), Startup Norway (NO), Art Rebels (DK) Kontraktspartner: Avanto Ventures (FI)
	<i>Sonderingsfase tekstilflore</i>	Kontraktspartner: Æra Contact: Mari Stølan,
	<i>Utlysning: New Circular Solutions</i>	
Competence	<i>Circular Business Models in the Nordic Manufacturing industry</i>	Kontraktspartner: Accenture
Ecosystems	<i>Nordic Circular Hotspot</i>	Lifestyle & Design Cluster (DK), Cradlenet (SE), RISE (SE) Kontraktspartner: Circular Norway
	<i>Nordic industrial symbiosis network – forprosjekt (avsluttet)</i>	Kontraktspartner: Eyde Cluster
Cities	<i>Utlysning: Circular Cities</i>	
Other (no module)	<i>RTO - Testbed forprosjekt</i>	VTT (FI), SINTEF (NO), RISE (SE) Kontraktspartner: Eyde Cluster

Health, Demography and Quality of Life		
Module:	Project:	Project partners:
Completed projects:		
Bridging Nordic Data Initiative + Prevention	<i>P - Scenarium processen og Nordic Health 2030 (Magazine)</i>	Centre for Future Studies (DK)
Bridging Nordic Data Initiative	<i>Interoperability Case</i>	NIP – Nordic Interoperability Project (Nordic)
Bridging Nordic Data Initiative	<i>Nordic Health Hackathons (Is, Fi)</i>	DattacaLabs (IS), Smash (FI)
Healthy Cities + Bridging Nordic Data initiative	<i>Nordic Health Hackathons (DK)</i>	DattacaLabs (IS), DTU/ Skylab (DK).
Value Chain Collaboration	<i>Grow your business Nordic – Workshop on Island</i>	Ministry of Health and Welfare, Iceland (IS)
Healthy Cities + Bridging Nordic Data initiative	<i>High Tech Summit</i>	DTU (DK)
Prevention, Bridging Nordic Data initiative, Value-chain Collaboration	<i>COVID-19 – Nordic solutions</i>	Cerner – Sweden (SE)
Ongoing projects:		
Bridging Nordic Data initiativ	<i>Juridisk udredning/ legal overview</i>	Deloitte (N, S, FI, IS, DK)
Prevention	<i>Impact startup Nordic</i>	<i>Den Sociale Kapitalfond (DK), Ferd Sosiale Entreprenører AS (N), Prosper Impact Consulting AB (S), Arvliitto ry (FI)</i>
Prevention + Healthy Cities	<i>Nordic Healthy Cities</i>	Nordic Smart City Network (Nordic)

Health, Demography and Quality of Life		
Module:	Project:	Project partners:
Bridging Nordic Data initiative	<i>Hackathons i Norge og Sverige (satt på vent grundet CoVID-19)</i>	
Call for events (similar to the Prime Minister's initiative, funds have been paid for a number of smaller events and projects):		
Value-chain Collaboration	<i>The future of Healthcare – sustainable and smart today</i>	TEM at Lund University/ Nordic Center for Sustainable Healthcare (S), Upgraded (FI), DTU (DK)
Value-chain Collaboration	<i>The potential of Nordic Health Data – an international metadata symposium</i>	Copenhagen Healthtech Cluster (DK), Swelife (S), Sitra (FI), The Norwegian Directorate for EHealth (N)
Value-chain Collaboration	<i>#NordicMade x Healthtech showcasing in Asia</i>	Asia House (DK), TechBBQ (DK), Sup46 (s), Maria01 (FI), Icelandic Startups (IS).

Annex 2 : List of interviewees by programme

Programme	Interviewee	Project or organisation
Nordic Mobility and Connectivity	1. Jane Jünger	Zero Emission Energy Distribution at Sea
	2. Jesse Fahnestock	Nordic Green Ammonia Powered Ships
	3. Jon Eriksen	Next Nordic Green Transport Wave - Large Vehicles
	4. Maria Fiskerud	Nordic Network for Electric Aviation (NEA)
	5. Mikkel Hansen	The Connected Ship
	6. Ole Svendgård	Maritime Energy Transition
	7. Trond Hovland	Nordic Open Mobility and Digitalisation (NOMAD)
	8. Valdemar Ehlers	Onshore Power Supply in the Nordic Region
	9. Rebecca Ronke	Sustainable Insights: Measure, Inform, Mobilise (MIM)
Nordic Sustainable Business Transformation	1. Bjarni Herrera	Nordic Circular Hotspot (KPMG, IS)
	2. Cathrine Barth	Nordic Circular Hotspot (Natural State, NO)
	3. Einar Kleppe Holthe	Nordic Circular Hotspot (Natural State, NO)
	4. Elin Bergman	Nordic Circular Hotspot (Cradlenet, SE)
	5. Jyri Arponen	Sitra (Not part of the project, FI)
	6. Katherine Whalen	Nordic Circular Hotspot (RISE, ex-partner, SE)
	7. Kim Hjerrild	Nordic Circular Hotspot (Lifestyle & Design Cluster, DK)
	8. Marika Ollaranta	Nordic Circular Hotspot (Business Finland, FI)
	9. Peter Michel Heilmann	Nordic Circular Hotspot (Wholistiq, NL)
	10. Sofie Pindsle	Nordic Circular Hotspot (Circular Norway, ex-partner, NO)
Health, Demography and Quality of Life	1. Anders Tunold-Hanssen	Project Manager Nordic Interoperability Project AS (NiP) (DK)
	2. Freyr Hólm Ketilsson	Dattaca Labs (IS)
	3. Ingi Steinar Ingason	Head of Division National Centre for eHealth Directorate of Health (IS)
	4. Guðrún Auður Harðardóttir	Project Manager National Centre for eHealth Directorate of Health (IS)
	5. Irene Olaussen	Ministry of Health and Care Services (NO)
	6. Teppo Rantanen & Tiia Joki	City of Tampere (FI) As part of Nordic Smart City Network and the Healthy Cities)
	7. Sigríður Valgeirsdóttir	Specialist, Deputy Office Manager Office of Tourism and Innovation Ministry of Industries and Innovation (IS)

Annex 3 : Case study template

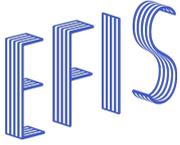
Title of the case study	
1. Introduction	What this case study is focused on, dates, duration, funding, stakeholders involved (i.e. how well does it contribute to 'Nordic added value')
2. Brief history	Why did it happen, any preceding activities, any preceding activities funded by the public sector (either Nordic Innovation or Nordic national agencies)
3. Goals (esp. in relation to the Programme)	<ul style="list-style-type: none"> • How was this case set to address the aim of the programme? • How specific was this objective? (e.g., developing Circular Business Models (CBM) in general vs implementing CBMs in a certain industry, like CBMs in Manufacturing Industry – Energy vs Machinery and Equipment) • How well does the objective of the case/ project address relevant societal issues and urgency of those issues? (e.g., 'connections with the EU's priorities within the innovation area (Horizon), the UN SDGs ...')
3. Results (esp. in relation to the Programme)	<ul style="list-style-type: none"> • What was achieved? • How was it achieved? • How instrumental was the input from Nordic Innovation in achieving the above results? • How well does the case address one (or more) of the strategy areas under the Nordic Co-operation Programme for Business and Innovation Policy, 2018–2021?
4. Impact	<ul style="list-style-type: none"> • Have the instruments led to the generation of results that would not otherwise be possible through national or other programmes? • How and what sustained impact was generated? (e.g., through enabling scalable and viable business models to be tested) • How well have the activities promoted cooperation between stakeholders across the Nordic countries? • To what extent have the programme's leveraged national co-funding (as an indicator of interest in the topics) • Have and how the results of this case brought relevance to a topic in another programme? • How did this case help to promote a wider understanding of the positive impacts of Nordic cooperation? • How novel or innovative are the pilot actions or projects in comparison to what is already done at national level?

Annex 4: questions for interviews

Core issues/questions	Specific questions for interviewees/discussion groups
<p>How clear is the intervention theory (Theory of Change) for each programme ?</p>	<ul style="list-style-type: none"> • To what extent do programme participants (funded projects) understand the expected effects of the programme (and how their own results contribute to it) • In your own words, how would you describe the expected outcome(s) of the programme ? Does this differ from what is set out in the programming documents (website presentation, action plan, call for proposals, etc.) • In what timeframe would you expect the programme to generate these outcomes: short-, medium-, long- term? [and how do you define these different timeframes] • Do you consider the [long-term] goals/ outcomes of the programme as achievable? What indicators (quantitative or qualitative) are most relevant to measure whether the programme has achieved its objectives ? • To what extent would you consider the programme supports a) ‘system’ or transformative change b) more targeted or ‘incremental’ innovations ? • Does the intervention theory fit with the aim of the programme with the intention to be “open, wide-ranging and allow for final concretization and delimitation to take place at activity level”? • Does the intervention theory for each programme support Nordic ‘technological development, innovation and changes that cannot be predicted at present while at the same time stimulate innovation and cooperation across sectors and ecosystems’? <ul style="list-style-type: none"> ○ If yes, are there any differences between the programmes of how well this has worked?
<p>Are the instruments used effective and have they generated a real impact on sustainable business growth and Nordic innovation policy?</p>	<ul style="list-style-type: none"> • What sorts of interventions (methods or instruments) do you consider are most relevant to deploy at Nordic level ? • Have the instruments applied led to the generation of results that would not otherwise be possible through national or other programmes? <ul style="list-style-type: none"> ○ If yes, what examples can you give ○ How would you measure this impact (quantitatively or qualitatively)? ○ Are there differences in the generation of results or any areas that stand out in terms of more noticeable/ measurable results? ○ If no, (1) why is that and (2) what could have been done differently? • At this stage, do you consider the programme is generating expected effects (outcomes) ? Do you have any examples ? • Are you aware of any differences between the desired (expected) and actual outcomes of the programme (or parts of the programme)? • Do the instruments generate sustained impact through enabling scalable and viable business models to be tested? <ul style="list-style-type: none"> ○ If yes, (1) how is this impact measured? (2) which indicators would be appropriate in your opinion to track the impact ? ○ In what way have the instruments contributed to generate sustained impact, why is the instrument effective? ○ If no, please explain? What could have been done differently to generate sustained impact? • Are there similar/complementary programmes / instruments at national level? <p>If yes, in which (1) countries and (2) can you suggest examples of programmes/ instruments that would be worth reviewing?</p>
<p>To what extent has the programme approach worked, in terms of fostering national anchoring and political interest?</p>	<ul style="list-style-type: none"> • Is there evidence of political interest in the programme approach/ or specific instruments in one or more the Nordic countries? <ul style="list-style-type: none"> ○ If yes, can you give some examples? • To what extent is there national (public and/or private) funding available for similar topics? [the idea is to check for complementarity/coherence bet to compare funding available between Nordic and national sources]

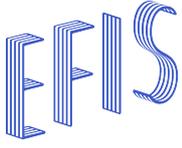


Core issues/questions	Specific questions for interviewees/discussion groups
	<ul style="list-style-type: none"> • Are there any national programmes/ activities/ measures, going beyond 2021, linked to the topics covered by the NCPBI and the three programmes? • How well have the methods/tools used or project funded promoted cooperation between stakeholders across the Nordic countries? <ul style="list-style-type: none"> ○ What sort of indicators/measures best capture the intensity or quality of co-operation? • Do you consider that certain projects or actions have been more effective in mobilising cooperation between stakeholders across the Nordic countries? • Are there focus areas within the programmes that have worked gained more interest or are better anchored nationally than others? <ul style="list-style-type: none"> ○ If yes, (1) which ones ? (2) why do you think this is the case (examples)? • Do you have suggestions for how the coherence between Nordic level programmes and national objectives or programmes could be improved?
<p>What areas of the programmes have contributed most to Nordic value added? Why and what are the background factors?</p>	<ul style="list-style-type: none"> • Through what mechanisms have the funded projects helped promote a wider understanding of the positive impacts of Nordic cooperation? <ul style="list-style-type: none"> ○ Why have these mechanisms been effective? • How novel or innovative are the pilot actions or projects in comparison to what is already done at national level? <ul style="list-style-type: none"> ○ What are the differences? ○ In what way are they ‘novel or innovative’? • Are the ‘Action Areas’ suitable considering the programme objective? • To maximise the impact on Nordic Added Value towards the 2030 Vision with the NI means available, is there any potential to cross-link focus areas between the 3 different programmes to create synergy effects and a more integrated approach • What criteria are used and/ or how are the projects evaluated in the selection process which one potentially can contribute most [impact] towards Nordic value added? • Have the programmes facilitated or fostered the co-design, co-development, piloting and ‘roll-out’ of operational solutions to challenges? • Is there a planned follow up of the impact/ success of the programmes or part of the programmes, how will the viability of what has been funded be assured beyond the end of the current funding, and in what way?



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Annex 5: Programme case studies



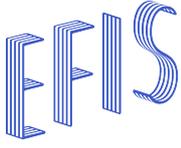
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Health, Demography and Quality of Life (HDQL)

Health Data as a foundation for building the most integrated health region

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1. Introduction

The healthcare system in the Nordics has long received a reputation of the most effective and well-functioning. Despite this quality and reputation, it is facing the challenges of the modern world, and that is a growing proportion of the elderly people as well as an increased prevalence of not always healthy lifestyle and chronic diseases. To keep the Nordic “jewel in the crown” shining at its current high level and to help aligning it with the requirements of the modern world, there is an increasing need to change the way healthcare systems think about priorities, deliver quality of health services and provide opportunities for the improvement. Long-term this should lead to the Nordics being **“the most sustainable and integrated health region in the world, providing the best possible personalised health care for all its citizens”**, the vision which is generally clear to the stakeholders involved in the HDQL program. To achieve this vision on a regional level a number of pre-conditions and resources are needed, such as transformation of the system from health care to health prevention thus actioning to achieve the 5/5 aspiration¹, population empowerment, data sharing and regional cooperation.

Through numerous discussions both internally at Nordic Innovation as well as with external stakeholders, health data was brought to focus as an important part in reaching the set vision for the program. The rationale here has been very clear and beautiful in its simplicity: on the one hand, health data (when properly utilised) can be used to improve quality of life in the Nordics moving from care to prevention, while at the same time it provides interesting opportunities for the development of new solutions and innovations, thus supporting Nordic companies in growing and strengthening their competitive advantage.

With this in mind, in this study we have looked at the HDQL program through the lenses of the case “Health data as a foundation for building the most integrated health region”. It was a deliberate decision not to focus on one HDQL funded project or activity but instead to look at a theme linking different parts of the program:

- health data is featured in the various HDQL program’s activities involving different types of stakeholders, thus giving a glimpse into all four focus areas in the program;
- looking into a variety of activities presents a portfolio approach and allows to assess if such an approach is the best way forward to deliver on the objectives of the program;
- having one unifying theme allows to check for synergies with national initiatives and look deeper into the Nordic value added of the overall program;
- it also sheds light on other regional and national activities linked to the health data theme thus giving a fuller contextual setting in which the HDQL program was set up and is being implemented.

2. Brief history and contextual setting

The objective of the HDQL program was set “to connect people, data and innovation for a better life” and do that through four focus areas:

1. innovation through data sharing (Bridging Nordic Data Initiative),
2. shifting focus from treatment to prevention (Preventive Health),
3. supporting healthy living and sustainability in Nordic cities (Healthy Cities), and

¹ The 5/5 aspiration proposes that by 2030, the Nordic countries should allocate 5% of the GDP to treatment and 5% of the GDP to prevention (be it primary, secondary, or tertiary). As a comparison today more than 10% of GDP is spent health care and only 0.3% on health prevention.

4. utilising the full innovation potential for the Nordics and beyond (Value Chain Collaboration).

Health data and a shift from health care to health prevention was supporting all four areas and became a cornerstone of the program. This touches the baseline review of which data is available, assessment of the national contextual settings, the legal framework regulating access, use and movement of data, the technical aspect of data sharing across borders, i.e., how to make data ‘transportable’. Sharing data can save lives, contribute to health prevention and can also have an economic impact. The target group for which this topic is of interest brings together varied stakeholders capturing health institutions, companies (large and small), patient groups, regulators, cities, as well individual citizens. With such diversity, interested groups look at the HDQL program for different reasons and, subsequently, have different expectations. The current set-up of the program allowed to capture these different interests.

To implement the program, Nordic Innovation allocated NOK 60 million for 2018-2021. **A combination of instruments** under four focus areas has been tested and seemed to have worked well. These ranged from stand-alone projects (e.g. Bridging Nordic Data, a legal overview of the use of secondary health data) to joint Nordic health events ranging in size (from webinars to the HealthTech Summit), from activities involving a hand-full of stakeholders (e.g. Grow Your Business workshop) to hackathons bringing a large number of teams and participants. Some of the instruments, such as hackathons, workshops and the brochure ‘The Nordic Digital Health Solutions for Covid-19’, were designed to show some immediate impacts. The brochure is probably the best example of ‘small money for big impact’. It is the most downloaded document from Nordic Innovation with interest to produce something similar coming from the USA and New Zealand. Representatives of the Danish industries, which (for various reasons) were not listed in the brochure, are now eager to be included. Another interesting example spanning across the borders is hackathons. These were covered by national media and attracted great interest.

The selection of instruments was both strategic and opportunity based but keeping in mind the diversity of the stakeholders needed to deliver on the main vision of the program (as described above). A number of brainstorm sessions were held with different stakeholders, including industry. What was critical for Nordic Innovation was to **pair up closed silos, widen the breadth of the involved stakeholders and allow for experimentation**. The underlying logic in this process was that innovation needs other groups to be involved rather than classic silos present in the health system. At the end different approaches (different instruments) were deliberately chosen. For example, a workshop in Iceland targeted companies in the health area which potentially would be interested to explore cooperation. Financially it was not a huge undertaking but the impact and timing was great. A network of like-minded and interested in the topic companies was built and Nordic Innovation still gets contacted by these actors. In addition to smaller and financially less intensive instruments, the program also has longer-term initiatives, e.g. setting up a Nordic Digital Medication Platform to establish a quality assurance and accreditation service for health apps. The intermediary role of Nordic Innovation here is really important in making this common platform a reality and a joint tool.

When working with the topic of personal data, a number of stakeholders interviewed for this case study underlined that it is important to start from the angle that individuals have a right to have easy access to their personal data. It is about increased citizens’ control over data. It is not just any more about data privacy and security but it is about the citizens’ decisions about when and how to use their own data. In some countries it is considered a norm for patients to carry their own health records (e.g. Iceland) and then share it with their doctors. In other countries this journey is still full of obstacles, also complicated in some places (e.g. Sweden) by the fact that the health system is run regionally within the country.

The topic of health data, its flow and use are complex and as such require discussions with and within different stakeholders both nationally and regionally, and also spanning outside the direct area of Nordic

Innovation. There are different Nordic cooperation groups linked to health and health data topics, which need to be considered:

- For example, there was an informal group bringing together annually the National Health Centre (Norway), eHealth Directorate (Iceland), the National Board of Social Services (Denmark), and their equivalents in Finland and Sweden to discuss health data flows. At the beginning they discussed a possible cooperation around health data projects but there were so many legal and regulatory obstacles (or unanswered questions) that it was decided to keep the projects nationally but bringing key learnings for a regional discussion. Development of a joint Nordic e-prescription system is a good example here: the work started 15-20 years ago but the system is still not in place mostly due to different laws and rules involved. Technically, however, it is still possible to make data flow between the countries because the lowest important level when working with this question is standards to allow for data comparison. Organisations in the Nordics are using in many ways similar classification systems for coding healthcare data, although of course some joint work needs to be done here and ensure all relevant organisations are onboard.
- The eHealth group at the level of the NCM involves ministries and health directorates. The NCM funds the eHealth group and then the group funds their sub-groups. The group is contemplating comparing national e-health policies (thus also looking into the topic of health data use cross-border); and one of the topics this group is thinking about is establishing a sub-group on health data. The funding is very limited allowing for 1-2 publications and some meetings, but the discussions happening in the group are extremely valuable for the topic to be high on the policy-makers agenda.
- The Nordic eHealth Research Network (NeRN) is one of the eHealth group's subgroups. Set up already back in 2012 it includes members² coming from e-health institutions as well as universities. The remit of the group is to develop common Nordic indicators for eHealth functionalities and services, and test them to produce data for use by national and international policy-makers and scientific communities to support development of Nordic welfare system. Countries continue working on a common health survey for citizens.
- Another group is the Nordic standardisation group looking into the International Patient Summary and sharing of data between the Nordic countries.
- Currently, in preparation of a new Nordic Innovation program on Life Science & Health Tech, representatives of the national government institutions are members of the reference group for the new program and are all interested in health data use.

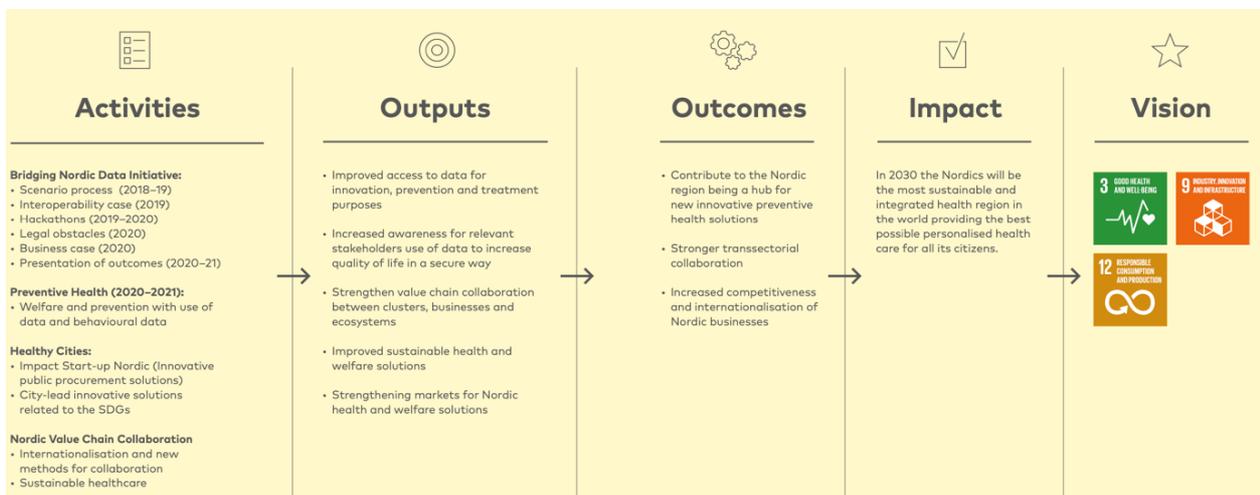
Mentioning these past and existing interactions between various regional and national stakeholders is important for understanding the contextual setting within which the topic of health data is being discussed and actioned on. It is a lot about engaging and building a broader ecosystem. To achieve this shift to prevention and to make data 'transferability' a reality **an involvement of a broader ecosystem** than those stakeholders which are classically considered as part of a healthcare system is crucial. This implies that effort is also needed to work across stakeholders and across silos through connecting various stakeholders and helping them to reach a common understanding. In the HDQL program it was possible to achieve this by

² <https://thl.fi/en/web/thlfi-en/research-and-development/research-and-projects/nordic-ehealth-research-network-nerm/organization-and-network-participants>

applying a very iterative process, which stakeholders understood and appreciated, and with Nordic Innovation acting as an **intermediator**.

3. Moving from set vision to results and impacts

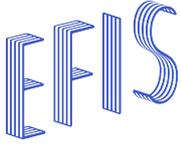
Nordic Innovation has used a Theory of Change (ToC) approach in designing their programs to ensure that the activities lead to a number of outputs, outcomes and subsequently impacts, also contributing to the delivery on a selected SDGs. A ToC for the HDQL program is shown below.



Nordic Innovation has supported a number of activities with their specific outputs (i.e. results) and outcomes, some of which are briefly discussed below.

When supporting initiatives which are close to the market, it is important to open people’s eyes on which solutions can be achieved and which cannot. Often legal aspects are brought into the discussion once the use, sharing and movement of health data is brought forward. Acknowledging this, Nordic Innovation funded the ‘Bridging Nordic Data’ legal report prepared by Deloitte, which was important in terms of investigating a question of legal interoperability. What was important was not just the problems around sharing data but also the possibilities given the interpretation of national legislation. Legal interoperability is a main obstacle in sharing / moving data; and while, it is difficult, the issue may be hidden in legal interpretation of the topic.

The Nordic Interoperability Project (NiP) focused on building Nordic Interoperability showcases to spark new ideas and solutions for the future; establishing physical and digital meeting places for discussions and knowledge sharing; and developing new commercial interoperability solutions for the Nordic healthcare industry. The project initiated from the healthcare IT industry during many conversations at the conferences and meetings where experts talked about health data as a new gold and that sharing of data can bring lots of opportunities for moving from health care to health prevention as well as developing new business opportunities. The NiP has three focus areas which have been carefully selected to show some results. These focus areas are: 1) building a Nordic Data Lake for secondary use of patient data; 2) establishing a Nordic Digital Medication Platform for accreditation and use of healthcare apps; and 3) supporting a Nordic Health Passport for citizens having health data available at the point of care. Showing results was absolutely critical as this is the best way to show the benefits in practice. One of the showcases was to focus on technical interoperability and during the first year a solution for sharing data was build (a solution but not the solution). This was to show how data can travel from one place to another. Discussing the topic of cross-border data sharing and agreeing on its potentially high value and possible impacts was crucial but the implementation



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of course takes much longer. Sharing of health data is a national and even regional (within a country) responsibility, making implementation a more complex task.

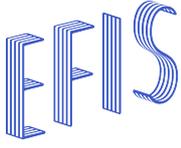
Discussions regarding data sharing and data interoperability (as in the NiP) would not be possible without the vision set by Nordic Innovation for the region to be the most interoperable as clearly set in the “Nordic 2030” report by aspiring the region to move to the 5/5 vision and building on three pillars: a new social contract with the individuals, new ways of sharing data and finding new business models. This in its own right is being implemented in parallel to the work supported by NordForsk around the Nordic Data Commons. The underlying rationale here is that the five Nordic countries are too small on their own but if the databases are combined regionally it will present an interesting opportunity for better utilisation of available data. This combined vision was a start for the Nordic Data Lake part of the NiP combining three countries in building a Proof of Concept for a certified Artificial Intelligence model. Trained first on data from Finland, the model will then be trained on the data from Iceland. This is a solution as the data are not being moved but only the AI model, presenting one possible (but not the only) solution for data sharing.

An example of a less complex task and project was a number of regional health data-focused hackathons. Iceland seemed a natural place to start a hackathon based on the national health data given that the people have access to their personal health data. The main idea was to show that giving the data back to citizens could create innovative new solutions. Under the hackathon project, four hackathons took place in Reykjavik, Helsinki, Copenhagen, and one online for Norway and Sweden. In Iceland and Finland access to the health data was provided but not in Norway or Sweden.

Looking into the overall rationale of the HDQL program and various funded activities the following picture emerges with regards to the possible short- to long-term impacts.

Short-term:
<ul style="list-style-type: none"> • Anchoring the vision derived from combined activities • New immediate solutions developed through the hackathons • Build networks lasting beyond the projects initiated through the program
Medium-term:
<ul style="list-style-type: none"> • Common framework for data sharing for innovation • Amended regulation on health data giving innovation possibilities • Continuation of collaborative partnerships that were established at hackathons • Platform becomes recognised as of value for application developers’ companies • Working business model connecting users and health providers • Collaboration between Nordic cities beyond the program
Long-term:
<ul style="list-style-type: none"> • Citizens becoming more responsible for their health • Switch to preventive solutions (the 5/5 aspiration) • Offer of preventive solutions by family doctors • Innovations and increase in income through the use of health data

Of course, to achieve those certain assumptions are needed and some external factors to be considered. For example, national policy-makers have to take some solutions available from the shelf (especially when certain efforts were made to test few things regionally); motivation of different players in the system needs to adjust



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overtime; the health system needs to be ready to move to preventive care; and regulators need to be ready to embrace the preventive nature of the health system. The role of Nordic Innovation in bringing showcases and pilot activities can offer needed evidence to allow for the changes to happen.

In many funded activities it is still too early to talk about generated and sustained impact. There are aspirations, however, that certain efforts will continue. For example, in the NiP it is too early yet to assess and judge impact, but the hope is that the results of the project will be able to push the agenda in the Nordics faster and that the results will help to save some time for the national initiatives. In the hackathons project, the activities opened up the thinking horizon on how to use health data for personalised solutions for individuals. The organisers noted that there was no lack of creativity in coming up with new solutions and how many exciting things can be built based on data (and not only health data); but, the availability of data is not in place as such. So, there is the volume, the scope and the quality of solutions possible to bring forward if only availability of data is in place. In this light the hackathons can be viewed not only as generators of innovative solutions but more as a showcase which, hopefully, opened the eyes of national organisations to make data available to individuals. According to the participants it was possible to achieve this but now more efforts are needed to sustain the effects and generate impact.

Hackathons (in general) are great for bringing forward ideas but there is a need for a format to take these ideas further. Such a support system was not in place for the HDQL program's hackathons. At least nationally in Iceland this idea is being taken forward with a setting up of a follow-up project (a kind of accelerator) to take place in autumn 2021 (during the Icelandic Innovation Week). The aim here is to create more solid solutions which could directly be implemented into the operations of the partners taking part in this activity. This autumn hackathon in Iceland is in a way an outcome of the hackathons organised via the HDQL. The organisers are eager for more innovation to emerge from the health data available in Iceland. Plus, there is one additional aspiration in mind. Participants might get interested more in linking into the health system and actually get interested in doing more for healthcare and even working in the healthcare sector. This will be an interesting impact on its own and not directly linked to the use of health data as such.

In the Healthy Cities project the bigger goal is to understand better how to collect data, how different sources of data can be put together, and how to tackle data availability issues (e.g. privacy etc.) and then bring that data back into the system. The big impact would be to help the healthcare system to understand how the data can be of use. Hence, small pilot projects are a way to show potential pathways of impact. To expect anything big and scalable is probably not possible given that the budget available for all four cities in the project run by the City of Tampere is about 100,000 EUR. What is possible is to find out how the principles can be applied, and especially with smaller city partners. Although it is not a big project, it has already shown a good response from the cities and nationwide as some other towns and cities have started looking into the topic too. It should be viewed more as a kickstarter of activities, which have not been done before.

4. The role of Nordic Innovation in moving forward the regional vision

The national identity and national priorities are important for taking Nordic-wide initiatives nationally. The governments of each country need to focus on how to make data accessible but first they need to make sure that data is available. Hence, certain work still needs to happen nationally first.

In many activities funded under the HDQL program the key aim was to have user cases in order to be able to showcase possible solutions and piloted examples. It is important to test identified ideas in practice and see what is coming out of that – both in terms of the results as well as possible obstacles. This ensures a feedback loop, which is crucial for better understanding of the user groups and further development of set ideas. All

initiatives need to be performed in iterative manner, i.e. trying out, changing or adjusting and moving forward. This is where the Nordic Innovation supported activities can be considered to be key, i.e. to have **demonstrators and valuable cases bringing this feedback loop.**

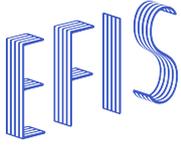
The Nordic aspect **gives all the participants more breadth in experience** as they learn from each other through joint activities. The Nordic Healthy Cities project initiated by the Nordic Smart City Network (NSCN)³ is a good example here. The project runs until April 2022 with NOK 5 million direct funding from NI (of the total project budget of NOK 10.2 million). It aims to mitigate and prevent health challenges by encouraging the public sector (cities mostly) to drive innovative solutions in cooperation with a private sector. Cities within one country (especially if the country is small like Finland) know each other well but it is mutually beneficial to look into learnings cross-country. The NSCN's 20 cities decided on five collaborative projects under this overall Healthy Cities project. Health data is a recurring theme. The project led by the City of Tampere (Finland) 'Private data and private health' focuses on gathering health data with the purpose of improving citizens health, supporting healthcare organisations and making citizens more aware about their own data. There were a number of small projects in the past on the city level looking at different ways to use health data but they were not taken forward in more details until this possibility to have a regional Nordic Innovation funded project occurred. The idea behind the project is to see if there is a bigger potential hidden around health data.

It is not really clear how the data can be best used by the cities and their citizens giving all the constraints around the health data mentioned earlier in this case study. Hence, it makes a perfect sense to have a starting point in knowing what type of data is there. The purpose of the project is thus to show value by combining different available public and private data sources. Once the data is known, longer-term it can be used for "predictive and prescriptive healthcare". This project alongside Tampere also involves pilots from Syddjurs (DK), Vejle (DK) and Tórshavn (Faroe Islands). The goal of the pilots is to gather data from selected focus groups on their activity into a unified data model which will enable its joint use. For example, the two cities in Denmark are measuring physical performance of school kids using wrist bands. The goal is to have at least 45 min of physical activities per day but there is no data to track this performance. Once this data is in place, the project will see how to combine this data with other data sets in order to generate even more knowledge that will lead to shaping the development of the city-level services.

The benefits from joint Nordic Innovation activities are visible. However, it is difficult to say if these would not have happened otherwise. For example, hackathons as such could have happened without Nordic Innovation. However, the initiative like this supported by NI is more important as it brings a 'helicopter view'. Not only did it support the implementation of this activity financially, but also conceptually as a way to contribute to the achievement of the 2030 vision for the Nordic region. As one of the criteria for hackathons was to have teams from different countries, it made it a Nordic event. Nordic Innovation played a vital role here. Hackathons regularly happen nationally too but having a regional vision and health data in focus made the event very attractive.

One of clear regional benefits is the promotion and long-lasting effect of **cooperation between stakeholders across the Nordics.** For example, the Nordic Digital Medication Platform (part of the NiP) was aimed to involve individuals. The idea was to put the accreditation platform in place for this solution to be in the Nordics. At that point the national health service in Finland has been assuring their quality solutions. The organisations behind this solution was brought on board. Cooperation between the cities within the Nordic

³ <https://nscn.eu/node/145>



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Smart City Network allowed for coming up with numerous ideas for the pilot projects and then through discussions agreeing to bring these all into five pilots.

Cooperation across the region when it comes to health data is paramount. Countries are relatively small and when there is an aspiration to do something with data, lots of data is needed. Nationally, the health data projects are grounded in different programmes but certain efforts around harmonisation of data are needed. It is a complex terrain and lots of things need to be discovered. Starting data-driven innovation, new obstacles that will feed back into other data domain will appear and will need to be overcome. In this context, Nordic Innovation is important: it can develop certain test beds, produce some results and evidence which bring more evidence through stronger cooperation in order to drive a set theme forward.

The Nordic Innovation funded projects for sure put forward some interesting – and often challenging – ideas. What is not visible enough though is how these NI supported projects and activities were then taken up and expanded – and financially supported – nationally. Despite the clear vision for the region and the clearly defined efforts by Nordic Innovation, **little is visible in terms of engagement of national funding in supporting** and – more importantly – taking further the results of the NI funded activities.

For example, in some project discussions with national representatives and especially in trying to deliver the message that this initiative can support national companies, the answer often heard was that the focus of this particular project is on the Nordic region and not one country. This made it impossible to leverage national funding. This is a peculiar situation: countries have data and data sharing on the agenda, lots of work has been put into that, many institutions are interested in the topic yet it is rather difficult to fund a joint regional effort. If this is overcome, the results can be bigger and the impact greater. If cross-border data-sharing can be shown on the Nordic level by using the region as a test bed, it can then be taken to the EU level. The five countries have a true opportunity here.

The Nordics can truly be a test bed as the countries have a common trust in authorities, a history of cooperation, democracy and similar culture, more or less the same language and the same welfare model.

5. Observations and considerations for the future program

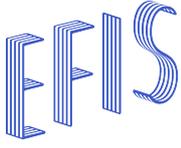
Ensuring national anchoring

Traditionally all five Nordic countries have strong healthcare systems with certain commonalities as well as differences. The intention of Nordic Innovation in their HDQL program was to further build on this strength, go deeper into the national health systems and more away from traditional way of looking at the health care. The main question was: Can we change the way the system and the society look at health care? The focus was placed on data as the foundation and stakeholders:

1. National takings on health data are very different and efforts are needed in this area. For example, in Finland and Iceland it is possible to get access to data. This is a usual practice in these countries to open as they realise they are 'too small to work on their own'.
2. By involving a diverse group of ecosystem players as partners as well as potential buyers would bring more innovation and allow to bring actors from what would have otherwise been silos. Here NI did some initial stakeholder mapping (including, for example, cities) and institutions in charge of data and data sharing. Cities, for example, got involved in hackathons allowing to test and apply some ideas and solutions. NI has also managed to involve the prime ministers' initiatives.

The program was well anchored in the initial phases, both among the industry as well as politically. In some countries there is a stronger national focus on health data which also allows to support the implementation of NI activities. However, the overall view is of a program for which activities do not progress further beyond the initial pilot or showcase stage:

- Nordic Innovation is one of the tools but the organisation and the funding allocated for experiments and projects are not big enough. It is acceptable that these are pilots. However, if the results of the pilots do not have a full uptake after the completion regionally or even nationally, then the question naturally emerges if such pilots are needed. Two options are possible: either this pilot/showcase approach should be scrapped and instead fewer but better funded project of regional significance funded; or the Nordic Council of Ministers have a stronger steering regionally in linking these regional efforts with national priorities and – more importantly – funding.
- If the NCM vision has already been taken on board in the region this should imply that the national support is in place. However, that is what is missing at the moment; or at least it is not clear. Some national activities are visible (e.g. a hackathon will be continued in Iceland but is it really due to the NI hackathons?) but not the national approach. There should be a clear plan of actions how the individual countries feed into the overall delivery on the set regional vision. If the NI funded activities are the only ones driving the implementation of the regional vision, there is a risk that the vision will not be reached. National activities should have their part of the puzzle. But if the pieces of puzzle are there, then they need to be communicated.
- To achieve a stronger anchoring, a different approach can also be tested. For example, to get a stronger uptake across the region, it might also be possible to start with an initiative / activity that proved successful nationally and take it forward (with certain modifications) to the Nordic level.
- In ensuring national anchoring, it is crucial to assess the capacity of national policy-makers participating in a given theme. Interviewed representatives highlighted the point that all stakeholder are eager to participate but the national tasks and pressures take their priority. Capacities nationally are different too. In some places the teams (especially within the policy-making organisations) are small and people are focusing on many different topics.



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- Another point to consider is the nature of national stakeholder that need to be involved and how it is linked to potential national funding. Sharing of data is the topic covered under the ministries of health but funding that comes to Nordic Innovation is from the ministries of economy/industry; or the link to NordForsk where the funding comes from the ministries of research/science. Here the alignment of goals to achieve set common goals, need to be achieved. When it comes to health data the responsibility is spread, which needs to be acknowledged and supported.

Contribution to the Nordic value added

National anchoring also helps to build and deepen the Nordic value added of the program. For example, collaboration between Nordic cities goes beyond the program, the hackathons linked a variety of Nordic stakeholders, the legal overview 'Bridging Nordic Data' prepared and published through the program is being used across the Nordics. The health certification platform is being built with the regional vision but also flexibility for national needs and characteristics. This shows a possibility of a joint Nordic solution.

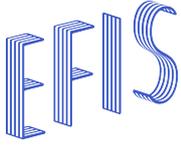
If the overall vision of making the high quality Nordic health data transferrable across the borders will – in the long-term – allow to optimise this data and harness its possibilities by the Nordic players and not those in the Silicon Valley. If the data can be used, it will allow the Nordic players to innovate and increase income. At the end of the day it will also help maintain the quality of the Nordic health system. There is no other way to preserve this model but by making it better. Having said this, certain improvements might be needed:

- This long-term plan for 2030 is not visible in practice. It is not a criticism of Nordic Innovation as such, but some clear guidance – perhaps via the NCM is needed. The communication and commitment around the 2030 vision should be showcased wider. Stakeholders across all Nordic countries need to be inspired and accept that the challenge is so big that the region cannot afford to have five different solutions.
- To further strengthen the Nordic value added, connections between different initiatives / projects need to be stronger and NI has a real role to play here. As soon as the project is chosen, it needs to be put into the various Nordic networks and initiatives. At the moment, it seems that projects are a bit of silos in themselves. Regularly and systematically sharing knowledge is important and absolutely critical for projects which are thematically linked.
- Some activities would benefit from more scrutiny, e.g. to ensure a broader representations of various countries in the activities; representations of representatives from all five Nordic countries; more companies involved in the funded activities etc.

Reflections on the Theory of Change

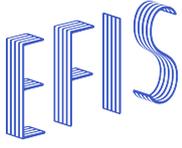
Looking at the existing ToC framework a number of observations has come to our attention:

- Although the major program's logic is based on health data and a move to health prevention, some of the activities are quite far removed from these foundations, e.g. internationalisation and exports, start-up activities beyond health data. Although it is probably possible to argue that all activities brought (or are still bringing) certain valuable outcomes linked to the overall program vision, some projects are not clearly linked to the health data and health prevention. A problem could lie in the unclearly defined impact of the program (see next point).



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- What is currently called 'impact' is the overall vision of the program but can be broken down to a number of potential impacts. If there is a certain foundation (i.e. data and a move to health prevention) these should be clearly included.
- A portfolio of activities ranging in size, duration, nature, type of stakeholders seems to have been designed in order to see (1) if one of a particular type of activities can lead better/faster (?) to the desired impact and/or (2) if such a combined portfolio approach is the best way forward.
- SDGs are important but in some circumstances contribution to the national healthcare systems becomes more important than SDGs. The assumption here is that if the quality of the healthcare system continues to be high, it will be possible to reach the SDGs too.
- The role of individual stakeholders (incl. citizens) is not clearly present in the ToC.

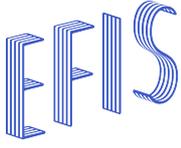


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Nordic Sustainable Business Transition (NSBT) – Lessons Learned

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1. Introduction

This case study is focused on learning from the portfolio of **Nordic Sustainable Business Transition (NSBT)** projects. The case study adopts a process driven (formative) evaluation approach to help Nordic stakeholders see how the program outcome or impact has been (or can be expected to be in the future) achieved. The case study is based on 10 interviews of one project, the **Nordic Circular Hotspot (NCH)** that was officially launched in 2019, and related events and activities that have been funded by Nordic Innovation during 2019 - 2021 (at the time of writing).

Following consultation with the NI advisors, NCH was selected as a single project case study based on its **timely relevance** and **potential impact** towards Vision 2030, to become the most sustainable and integrated region in the world, as well as having **partners across all the five major Nordic countries**. The latter argument gave the opportunity to ask about national activities in circular economy and national anchoring and co-funding of NCH.

NCH was not a planned project under the NSBT program but received funding from the available program budget under different phases and for different activities. Furthermore, NCH has had a 'organic' development, meaning that there has been changes in number of partners attached to the project and their representation across the Nordic countries as well as the organizational and managerial structure of the organization. The project started with partners representing three Nordic countries, Denmark, Norway and Sweden. At the time of writing there are eight managing partners representatives from all five Nordic countries (Denmark 1; Finland 1; Iceland 2; Norway 2; Sweden 1) plus one external from the Netherlands. Two partners, one from Norway and Sweden respectively, that were aboard the project at the beginning have left NCH.

Insight from other projects under NSBT was considered but no interviews were conducted. However, their value and connection with projects within NSBT was discussed during the interviews (see chapter X).

2. Brief history and contextual setting

The Nordic region is often seen as a role model with regard to the environment and climate. Nature and a balanced life style are important to the citizens of the Nordic countries. Back in 1989 the Nordic Council of Ministers decided to introduce an official Nordic ecolabel - the Nordic Swan Ecolabel, with the purpose to make it easy for consumers to find environmentally friendly products and as a guide for companies how to produce them. In 1999 the label was extended to include services and in 2005 the first newly built house received a Nordic Swan Ecolabel.

However, while the Nordic countries have been doing quite well on sustainability and environment in general, there are two exceptions: climate and sustainable consumption and production. In terms of Nordic cooperation, the picture is similar for circular economy with efforts taking place on a national level with dispersed results (see 'Country level' below). While **Finland** was the first country in the world to present a national circular economy plan in **2016**, it was closely followed by the Netherlands the same year; Portugal in 2017; **Denmark**, Greece, France, Slovenia in **2018**; Poland in 2019; Spain, **Sweden** in **2020**; and Luxembourg and **Norway** in **2021**.

On a European level, in **2011** the **European Commission** adopted its **Roadmap for a Resource-Efficient Europe** and aimed at decoupling resource consumption from economic growth. In **2013** the EU adopted its **7th Environment Action Programme (EAP)** that guided European environment policy till 2020. One of the three key objectives was to turn the EU into a 'resource-efficient, green, and competitive low-carbon

economy⁴. This followed by the first **Circular Economy Action Plan (CEAP)** in **2015**, with a renewed CEAP adopted in 2019 that is part of the **European Green Deal** from **2019**. The Green Deal aims to ensure that the EU becomes climate-neutral by 2050 and to protect the natural habitat for the good of people, the planet and economy. To reach this target, the Green Deal will support all sectors of the economy: Energy – to decarbonise the energy sector; Buildings – renovate buildings to cut energy use; Industry – support innovation and to become global leaders in green economy; and Mobility – cleaner forms of private and public transport. An important milestone for the EU towards 2050 is to reduce its net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels. On 14 July 2021, the European Commission presented proposals to deliver these targets and make the European Green Deal a reality (see the Architecture Factsheet⁵).

It is also important to mention **eco-innovation** as it is an important enabler for green growth and transition towards circular economy and is also now part of the new CEAP (2020). The first round of funding by the European Commission of eco-innovation projects took place in 2008-2011 and in **2011** the European Commission developed the **Eco-innovation Action Plan (EcoAP)**⁶ with the aim to promote a wide range of eco-innovative processes, products and services and also includes a pilot programme to help cutting-edge green technology to reach the market. For the period 2014-2020, eco-innovation has been funded under Horizon 2020, LIFE, COSME, ESIF and the Investment Plan (2015-2017).

Internationally, the **Sustainable Development Goals (SDGs)** set up in **2015** by the United Nations General Assembly with the aims to be achieved by the year 2030 and the **Paris Agreement** sets the holistic framework. In 2017 the **World Economic Forum (WEF)** launched the **Platform for Accelerating the Circular Economy (PACE)**, a platform for public and private sector leaders to take commitments and accelerate collective action towards the Circular Economy. Furthermore, **OECD** launched the **RE-CIRCLE** project in **2018**, a policy guidance on resource efficiency and the transition to a circular economy.

A brief looking at Nordic country level in terms of circular economy developments:

- **Finland** wants to become a forerunner in the circular economy and has ambitious goals to transform its economy into a circular one by 2035. In 2014 Finland launched their BioEconomy Strategy and, as mentioned above, in 2016 Finland adopted the first circular economy roadmap in the world. In addition, the City of Helsinki has created its own circular economy roadmap, adopted in 2020. The country organised the world's first circular economy forum in 2017 (WCEF 2017) and other events to promote circular economy. In addition to the bio economy strategy, a driver in Finland's eco-innovation has been its ambition to focus on clean tech clusters expressed in the national clean tech strategy⁷ from 2014 and has been successful both in motivating collaboration between and amongst actors within it as well as extending their market reach (Beckers, 2018). In general Finnish people love nature and are open minded towards environmental issues, the circular economy and eco-innovation, hence they are keen to adapt corresponding tools, schemes or products (Beckers, 2018). Sitra, the Finnish Innovation Fund, works according to five goals of which the first one is about "The ecological reconstruction of society and everyday life ensures adaptation to the earth's carrying capacity"⁸. In 2018, Sitra presented the *Circular*

⁴ <https://ec.europa.eu/environment/action-programme/index.htm>

⁵ https://ec.europa.eu/commission/presscorner/detail/en/fs_21_3671

⁶ https://ec.europa.eu/environment/ecoap/index_en.htm

⁷ Government Strategy to Promote Cleantech Business in Finland

⁸ <https://www.sitra.fi/en/topics/strategy-2/#vision-effectiveness-targets>

Economy Playbook for Finnish SMEs and became an inspiration for the *Nordic Circular Economy Playbook* published in 2021.

- **Denmark** - under the ministry of environment (MUDP⁹) - has been promoting eco-innovation since 2006 and has decided to be a low-emission society in 2050, independent of fossil fuels, backed by an ambitious policy framework through a multiple-solutions approach. In the latest action plan for 2021, MUDP has four focus areas of which one is on promoting circular economy, especially in the waste sector. A driver for Danish eco-innovation is its reputation of its green tech and knowledge and skills in green transition and energy, which it has built up over the years. One important factor for this success has been the *State of Green*, a not-for-profit, public-private partnership between the Danish Government and Denmark's four leading business associations¹⁰ founded in 2008 that works to create relations with international stakeholders and offer Danish solutions that enable green transition. In 2016 the Danish government established the Advisory Board for Circular Economy, consisting of business executives, including representatives from SMEs. In 2017 the Board delivered a report to the Danish government with 27 recommendations for specific efforts Denmark should focus on in order to promote the transformation into a circular economy. Based on these recommendations the Danish Strategy for Circular Economy was launched in 2018.
- **Sweden** has implemented a range of policies since 2011-2014, when the Swedish government implemented the Environmental Technology Strategy, which aimed to increase commercialisation of innovative environmental technology and exports from the environmental technology sector. In the field of circular economy some of the most important policies produced were the innovation partnership programmes, the Industrial leap, Smart City Sweden, the Climate leap and the Fossil-Free Sweden Initiative (Jansson, Swenning, & Eriksson Berggrenq, 2018). Launched in 2016 by the Swedish Energy Agency, Vinnova and Formas as a Strategic Innovation Program for six years (with a possibility of an extension of another six years), *RE:Source* is a national innovation arena that supports the development of innovations that can contribute to a more efficient use of resources in both society and business. In July 2020 the Swedish Government adopted the national circular economy strategy with the ambition for a long-term and sustainable transition of Swedish society. Strong links of circular economy goals to the climate objectives and Agenda 2030 are made in the strategy and one of the focus areas is to use the circular economy as a driving force for the business sector and other actors through measures to promote innovation and circular business models (CBMs) (Petersson, Ricksten, Ryd, & van Rooijen, 2019).
- In 2017, the **Norwegian** government launched a strategy for green competitiveness and green growth. In 2018, the Norwegian Parliament asked the government to create a national strategy for circular economy. The same year Norway became a part of the EU circular economy package. A recent report, *The Circularity Gap Report Norway 2020* shows that only 2.4% of Norway is circular. A study for national circular economy strategy was conducted in 2020¹¹ and the same year the Norwegian Minister of Climate

⁹ Bestyrelsen for Miljøteknologisk Udviklings- og Demonstrationsprogram

¹⁰ Danish Ministry of Climate, Energy and Utilities; Ministry of Foreign Affairs Danish; Ministry of Industry, Business and Financial Affairs; Ministry of Environment Denmark; Confederation of Danish Industry, the Danish Energy Association, the Danish Agriculture & Food Council and Wind Denmark.

¹¹ https://www.regjeringen.no/contentassets/7ca1a81f57cc4611a193570e80c4dafd/deloitte_study-on-circular-economy_short-summary.pdf

and Environment, presented a vision of a circular economy in Norway in 2020¹², no official strategy has so far been presented.

- **Iceland** has been harvesting renewable energy for more than a century and is aiming for carbon neutrality by 2040. While there are good examples of green tech cases on Iceland there is no national vision or strategy of a circular economy transition. However, the government’s fiscal strategy focuses on sustainable productivity, a reduction in GHG emissions, monitoring risk factors, and green solutions for the environment.

While not intended as an extensive account of all circular economy related activities, this was meant as a short overview where the Nordic countries stand in terms of national policies that can have an impact in support of and encouraging businesses and organisations to transition to a circular economy. The overview suggest that 1) the Nordic national circular economy strategies are in different phases; 2) the topic has different levels of priority in national policy; and 3) compared to other countries and institutions, some Nordics are at the front while others playing catching up. An interesting footnote linked to the above snapshot of circular economy progress in the Nordic countries regards the question on who the Nordic consumers think have the main responsibility for a circular transition. A consumer survey on the Nordic market for circular economy came to the conclusion that “the largest difference amongst the Nordic countries is that Norway puts more responsibility on government and municipalities and less responsibility on companies than the other Nordic countries” while the other Nordic consumers think that citizens themselves have the largest responsibility, especially in Finland (Nordea, 2019). The argument is that Norway has a large public sector “which creates a high belief in the state as a problem-solving mechanism”.

The **NSBT program** was based on the Nordic Co-operation Programme for Business and Innovation Policy 2018–2021. It is one of Nordic Innovation’s three thematic priorities for the period 2018–2021 with a total program funding of NOK 60 million. The program supports the vision adopted by the Nordic Council of Ministers and the Nordic prime ministers in August 2019 - making the Nordic region the most sustainable, integrated region in the world by 2030. The program builds on previous work in Nordic Innovation, NordForsk and Nordisk Energiforskning, including the marine innovation program, Green Growth, especially the CIRCit project¹³, and several other of the Prime Minister's initiatives. The networks formed in these initiatives are actively used in the program.

The objective of the NSBT program was “to take circular economy from strategy to business” by supporting “new ecosystems, piloting of new circular economy solutions, and work to increase competence and improve circularity in cities and regions through Nordic projects”. Through the program, Nordic Innovation wanted to contribute to the transition to a circular economy through entrepreneurship, innovation and competitiveness in Nordic businesses, hence to enable sustainable growth in the Nordic region.

The program was built around **four action areas**, which will continuously be developed as the program is progressing.

1. **Competence** - driving change through competence and new business models.
2. **New Solutions** - accelerating business through innovation.
3. **Circular Cities** - public private collaboration.

¹² <https://www.regjeringen.no/en/aktuelt/visions-and-ambitions-for-a-circular-economy-in-norway/id2740057/>

¹³ <https://www.nordforsk.org/projects/circuit-circular-economy-integration-nordic-industry-enhanced-sustainability-and>

4. **Ecosystems** - building networks and connecting competences and people.

In addition, there were a number of **mission statements** for the program:

- Support Nordic businesses in implementing circular business models: skills, tools & competence to lead the transition.
- Enhance awareness about circular business models.
- Build Nordic ecosystems and value chains, that make it easier for companies to implement their circular strategy and establish new partnerships.
- Facilitate the development of new Nordic solutions that can enable the transformation towards a circular economy.
- Bring Nordic companies, public authorities, industries, NGOs and other stakeholders together to identify and create synergies.
- Brand Nordic circular solutions and the Nordics as an innovative circular region to the rest of the world.
- Support Nordic cities and regions as frontrunners in shaping and implementing circularity.

15 projects were financed during the programming period that covered a wide variety of activities in support of: knowledge and best practice exchange, pilots, feasibility studies, collaboration and creation of ecosystems, development of processes, test beds, export promotion and visibility, and even reports and papers. Of these only a few included partners from all five Nordic countries, not taking into account the PROACTIVE project that was focused on the Nordic island countries with the logic that if “it is possible to set up such a system [of end-of-life handling of Li-ion batteries] at these challenging locations, it would be possible to do the same in any other country and region.”

Overall, there seem to have been a good mix of a few small projects, like the Metal Waste Reduction in Tinsmith Workshops in the Nordic Countries, to larger scale projects with a long-term Nordic value-added impact, like the Nordic Circular Hotspot or the Nordic Transition Partnership for Climate Neutral Cities 2030 (NTP). Projects like the Metal Waste Reduction in Tinsmith Workshops can serve as proof of concept of what can be done with circular economy business models.

The aim to create networks and collaboration, bring silos together and involve a wide range of stakeholders across the borders, to exchange and develop ideas and find solutions, seem so have worked quite well in accordance to the mission statement. The program has helped to build Nordic ecosystems and networks, like the **Circular Business Models in the Nordic Manufacturing Industry** and the **Nordic Circular Hubs** projects; has facilitated the development of new Nordic solutions and to enhance awareness about CBMs. Nordic Innovation has made an important contribution in this regard and there have been a number of successful activities: like the launch of **Nordic Circular Hotspot** at **WCEF2019**, **Nordic Circular Summit 2020**, **WCEF online side event**: Leveraging the full power of ecosystems – transitioning to a circular Nordic region (2020), the launch of the **Nordic Circular Economy Playbook** (2021) and **Nordic Circular Arena** (2021). Despite the COVID-19 pandemic, it has also allowed to democratize, an important Nordic value, participation when events had to go online by making it possible for people to attend who otherwise would not have had the opportunity to do so. This has most probably in turn lead to higher attendance, with other words **increased exposure** of the topic and awareness raising and visibility of NI funded projects and activities. As one of the interviewees pointed out, that the biggest value of Nordic Innovation is to bring stakeholders across the Nordics together and create ecosystems. On the other side, even if a wide range of stakeholders have been taking part across the different projects, a closer look needs to be made into each project in regard to the

diversity of stakeholders, both in terms of representing different public and private sectors as well as representing the different Nordic countries.

Taking a closer look at the **Nordic Circular Hotspot**, as it was the project for which interviews were carried out, and its relation to the NSBT program. Originally not a planned project under the NSBT program, the idea of a Nordic Circular Hotspot emerged when three women from three different Nordic countries met during the Holland Circular Economy Week (HCEW2018) in the Netherlands. They wanted to start a similar organisation in the Nordics and the only organisation ready to fund the idea was Nordic Innovation. After a pre-phase financing, the Nordic Circular Hotspot was officially launched in June 2019 during the WCEF2019 in Helsinki with objective to become the go-to place in the Nordic region for circular economy knowledge sharing and a source of new opportunities for businesses, civil society, research and public authorities. In addition, the Nordic Circular Hotspot wants to help brand the Nordics as a hub for innovation within the circular economy. It will become the window into the Nordic circular economy landscape and ecosystem from the outside and connect Nordic stakeholders to each other to create synergies and to explore new collaboration possibilities. Funding and the inclusion of Nordic Circular Hotspot as an instrument of NSBT was ‘good timing’ as the project addresses the focus areas of the NSBT program very well and its potential contribution towards Vision 2030 can be become significant.

This is also well in line with the Nordic Council of Ministers Action Plan for 2021-2024 - *The Nordic Region – towards being the most sustainable and integrated region in the world* - that sets out a plan how to move towards Vision 2030 with targets what should be achieved by 2024. The vision is supported by three prioritised strategic areas: A green Nordic Region, A competitive Nordic Region, and A socially sustainable Nordic Region. Linked to these strategic areas are 12 objectives under which circular economy is a main instrument for Objective 3 – *The Nordic Council of Ministers will promote a circular and bio-based economy, sustainable and competitive production, sustainable food systems, and resource-efficient and non-toxic cycles in the*, and mentioned as one instrument under Objective 6 – *The Nordic Council of Ministers will support knowledge and innovation and make it easier for companies throughout the Nordic Region to take full advantage of the development opportunities created by the green, technological, and digital transformation and the growing bioeconomy* – on the action point to better involve the business community in the efforts relating to the green transition in the Nordic Region.

Considering that climate change and biodiversity are two global issues, as it is for the Nordic region, that need urgent attention, circular economy is seen as a key tool and driver in solving them. The three are closely intertwined, as EU has indicated with its CEAP and Biodiversity strategy for 2030 under the European Green Deal. Circular economy is all about collaboration and requires that all stakeholders to work together to create system change. While the NSBT program has gathered many stakeholders and created new collaborations and synergies within projects, and even between projects like between the Nordic Circular Hotspot and Nordic Transition Partnership for Climate Neutral Cities 2030 (NTP), there is room for improvement.

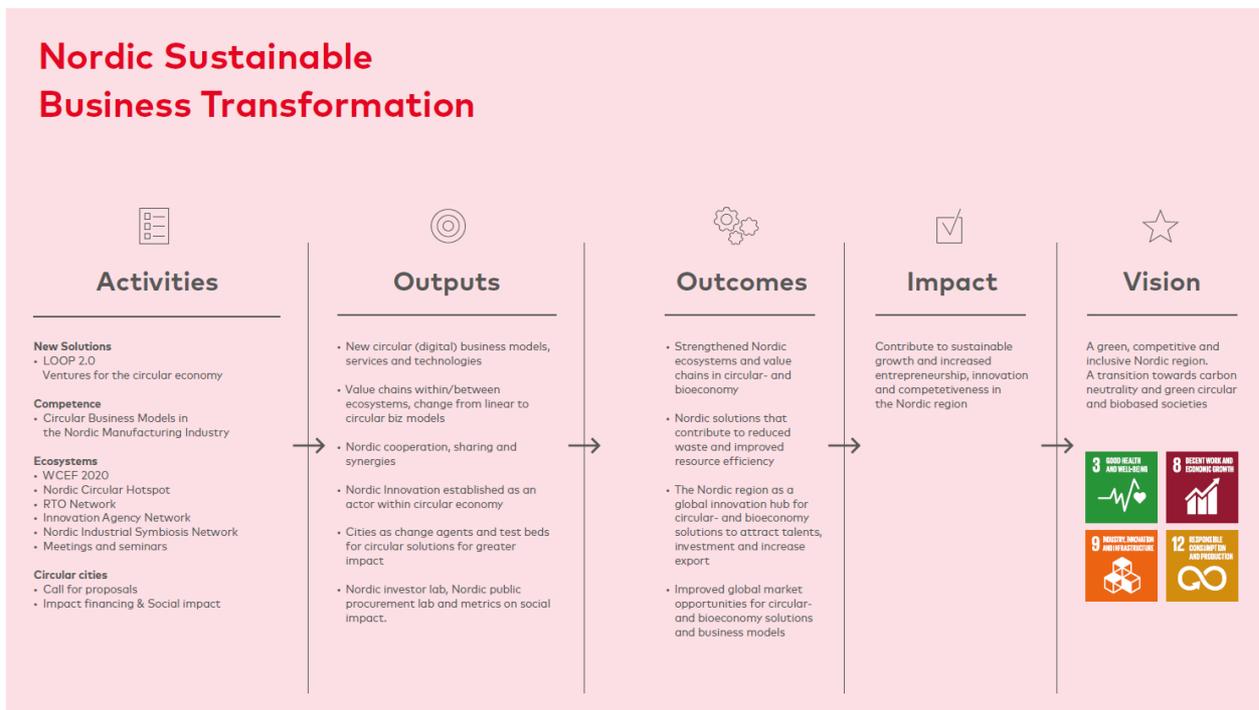
3. Moving from set vision to results and impacts

Nordic Innovation has used a Theory of Change (ToC) approach in designing their programs to ensure that the activities lead to a number of outputs, outcomes and subsequently impacts, also contributing to the delivery on selected SDGs. A ToC for the NSBT program is shown below (see figure below). The ToC figure shows that Nordic Innovation has supported a number of activities with their specific outputs (i.e., results) and outcomes, some of which are briefly discussed below.

The expected impact speaks of to “contribute to sustainable growth and increased entrepreneurship, innovation and competitiveness in the Nordic Region”. The question is 1) what is considered as a contribution, and 2) how to measure it? Looking at the Nordic Innovation Annual Report from 2020, reports following performance targets:

- **Contribute** to bring the circular economy from a strategic perspective to new solutions and new business models.
- **Further develop** a Nordic network and innovation ecosystem within bio- and circular economy and increase efforts from the public sector within CBMs.
- **Initiate measures** to create value chain co-operation in Nordic and other markets with great potential for Nordic companies.
- **Contribute** to EU synergies with Nordic consortia and partners for strengthening Nordic ecosystems and value chains.
- **Strengthen** co-operation between Nordic clusters and mobilize for joint innovation projects.

Figure 1: Theory of Change – NSBT



Source: Nordic Innovation annual report, 2019

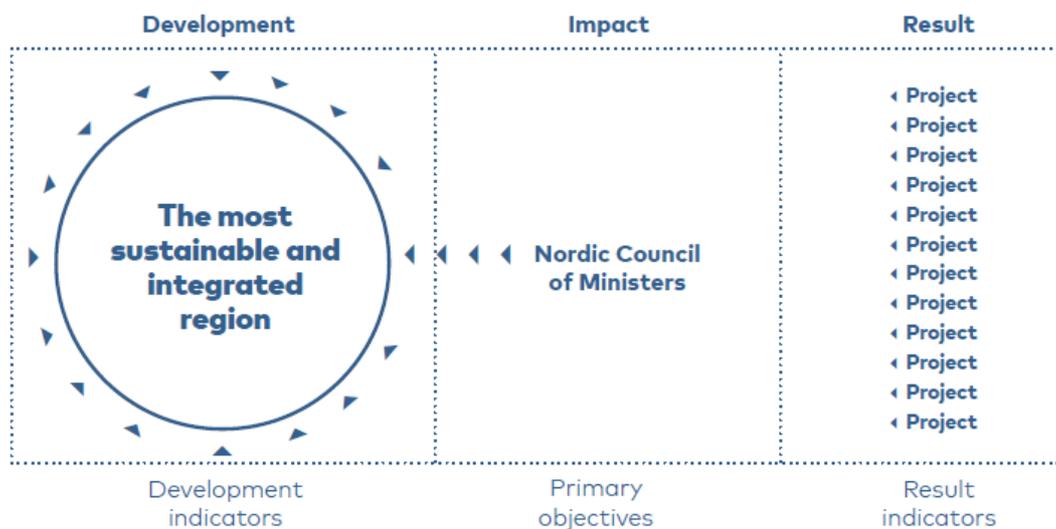
These are very open objectives and do not specify what these are or what is a satisfactory achievement. While there are facts and figures presented in the Nordic Innovation Annual Report 2019 and 2020, there are no target indicators to be used as reference to evaluate the outputs and their impact on the vision. In the *Årlig handlingsplan 2020 NSBT*, a set of indicators are listed and results for 2019 for these are provided, however no target figures are given for 2019 or 2020. The same can be said about the NSBT vision, very open, ambitious but no concrete targets. Sitra is preparing a playbook for governments and international communities to establish their own road maps for a circular economy transition. One of the seven key advice

and lessons is the need to “Create measurement indicators, monitor development and set stages for the journey” (Herlevi, 2020)

However, according to the Nordic Council of Ministers Action Plan 2021-2024, emphasis will be made on concrete results in the priority areas to ensure that efforts made lead to changes and that the momentum. A midterm evaluation of efforts relating to Vision 2030 will be conducted in 2022. This could offer an opportunity introduce more concrete targets on program level and focus on activities with highest impact potential (see figure below). For instance, the Nordic Innovation Annual Report 2020 states that of the 64 companies that participated in the Circular Business Models in the Nordic Manufacturing Industry workshop series during 2020, 97% reported that they are working to implement CBMs. A good measurement of success could be to follow up on these companies 2-3 years later, to 1) see how many of them have implemented CBMs and 2) how many of the 102 ideas that came about during the workshop they have adopted. A success target could be that 75% of the 97% positive responses have implemented CBMs.

It is no doubt that Nordic Innovation has managed to create relevant and valuable activities that have contributed towards the outputs, especially *Nordic cooperation, sharing and synergies*, and the vision, contributing to Nordic added value. This is underpinned by most interviewees who stated that many activities would not have taken place at Nordic level, especially when it comes to the creation of Nordic ecosystems and the Nordic Circular Hotspot, if Nordic Innovation would not have (co)funded these projects and activities. However, it is more difficult to see evidence if the range of these projects and activities will have a lasting or significant impact towards the vision and reach the desired outcomes. Considering the nature of the vision, one of the reasons can be that it is too early to evaluate or not possible to measure any results.

Figure 2: Monitoring and evaluation process towards Vision 2030



Source: *The Nordic Region – towards being the most sustainable and integrated region in the world: Action Plan for 2021 to 2024 (Nordic Council of Ministers, 2020)*

This discussion is to be understood in the context of the scale of what the NSBT is trying to achieve or contribute to. Transforming business and organisations from a linear to a circular economy is about changing a deeply rooted economic system from one to another. We are talking about a paradigm shift of an economic system, change of people’s ways of thinking and acceptance. As such they need to get everyone on board to

collaborate: “Shifting the system involves everyone and everything: businesses, governments, and individuals; our cities, our products, and our jobs” (The Ellen MacArthur Foundation¹⁴). Nordic Circular Hotspot is also pointing this out under its Partnership Programme, that collaboration is the ‘key’ to a successful implementation of circular economy¹⁵ -and underpinned by the survey funded by Vinnova and conducted by NCH (2019 - 2020) - ‘the need for increased Nordic co-operation and thus the potential for a Nordic Circular Hotspot’¹⁶.

Hence, Vision 2030 will require wide-ranging changes in the underlying economic, technological and social systems of the Nordic countries, a challenge for both the governments as well as for the civil society. A useful concept to look into in this context is **System Innovation (SI)**, that takes a horizontal policy approach to mobilise technology, market mechanisms, regulations and social innovations to solve complex societal challenges within a framework of interacting or interdependent components. OECD used the concept in a System Innovation project where it tested a range of selected policy tools that could be used to promote green growth¹⁷. Amongst the key findings is the need for the development of long-term policy strategies, that include a defined roadmap and policy targets with milestone and impact indicators. Already ten years ago OECD presented the *Towards Green Growth* package, that includes indicators and tools for delivering green growth¹⁸.

Looking into the overall rationale of the NSBT program and various funded activities the following picture emerges with regards to the possible short- to long-term impacts:

Table 1: Short-to-long-term impacts

Short-term:
<ul style="list-style-type: none"> • Showcasing Nordic activities in circular economy. • Connect stakeholders and establish networks lasting beyond the projects initiated through the program. • Creating access to circular economy tools and platforms for collaboration and knowledge sharing (Nordic Circular Arena)
Medium-term:
<ul style="list-style-type: none"> • Continued NI support and facilitation to foster collaboration, knowledge sharing, matchmaking, capacity building, intelligence and investments in circular economy solutions. • Create transversal cooperation between networks and relevant stakeholders to create synergies (industries, public and private economic sector, regulatory and government). • Nordic Circular Hotspot is the leading resource for circular economy in the Nordics. • Development of a Nordic brand in circular economy. • Address regulatory, tax, etc., issues at national level that cause barriers to a truly circular Nordic market. • Make better use of national experience, competence and work done and bring it to a Nordic level – best practise (e.g., Nordic Circular Economy Playbook).

¹⁴ <https://www.ellenmacarthurfoundation.org/circular-economy/what-is-the-circular-economy>

¹⁵ <https://nordiccircularhotspot.org/partnership>

¹⁶ <https://www.vinnova.se/p/nordic-circular-hotspot---kartlaggning/>

¹⁷ <https://www.innovationpolicyplatform.org/www.innovationpolicyplatform.org/system-innovation-oecd-project/index.html>

¹⁸ <https://www.oecd.org/env/towards-green-growth-9789264111318-en.htm>

Long-term:
<ul style="list-style-type: none"> • The use of CBMs becomes the norm amongst Nordic companies. • More sustainable cities. • Increased exports of Nordic circular products and services • Critical mass is achieved using circular and sustainable practices reaching the transitional tipping point for systemic change. • Signs of positive Nordic impact towards climate change and bio diversity, increased resource efficiency.

Source: authors based on Nordic Innovation documents and advisors' interview.

4. The role of Nordic Innovation in moving forward the vision

As we have seen above, the Nordic countries are at different stages in the implementation of national circular economy strategies as well as type of instruments used to achieve the objectives. There are several reasons for this, like different national targets related to climate change mitigation, how to tackle waste, availability and type of natural resources, and industry structure. On the other side, Nordic culture is what unites the Nordic countries to cooperate and projects common Nordic values to the world. During an online meeting the Nordic ministers jointly stated that culture is the driving force for sustainable development in the Nordic Region¹⁹.

While the Nordic Council of Ministers have signed off **Vision 2030** to become the most sustainable integrated region in the world, it is **unclear what this exactly entails**. What does it mean becoming the most sustainable region in the world? Is it relative to how other regions fare, risking to achieve the vision 'easier' if other regions do not have high set targets and do not manage to achieve them? And what other regions are referred to? Would it not be better to have clear targets that are ambitious but achievable and that can be easily measured? Similar questions can be raised for the NSBT program vision. These are of course issues for Nordic Ministers to answer, nonetheless it raises the issue of how to measure progress towards the vision and what role NI is playing in moving forward the vision.

We can look at it from a different perspective and approach it at the level of influence Nordic Innovation has and resources available, both human and financial, to execute activities towards the vision. Compared to the European Commission and funding available, Nordic Innovation comes out as a very small player. Many interviewees pointed out the need for **more (complementary) funding**, but this could have been specific for Nordic Circular Hotspot. One point raised during the interviews is that with the level of funding NI should focus more on **funding implementation rather than innovation** – "There is enough funding available at national level through the innovation agencies for innovation, but not for implementation".

Most of the projects under NSBT are about getting stakeholders together across the Nordics to collaborate, not to innovate or to test innovation (with some few exceptions), because that is where the Nordic added value is, where NI can create largest impact. The issue regards the time some partners spend on projects that are financially not covered (in-kind). While this is not an issue for representatives that are employed in organisations like governmental innovation agencies, universities or municipalities, where it becomes part of their daily job, it could become an issue for **SMEs**, especially for smaller ones. This is relevant considering that one of the NI funding criteria is to target SMEs. The logic in the context of driving the vision is that there

¹⁹ <https://www.norden.org/en/news/ministers-say-culture-driving-force-sustainable-development-nordic-region>

is a risk that the projects never live up to their potential or even ‘fade away’ if partners cannot commit or stay in the project.

Another point of action NI could take is **ensure good representation of stakeholders from across the Nordics** in activities where possible – ensure ‘Nordicness’. For instance, Nordic Circular Hubs did not include any partners from Finland and Iceland, although clusters do exist in these countries. While no one can be forced to be part of a project, NI could point out and suggest the inclusion of additional partners so that the ‘Nordic added value and additionality’ criteria is better fulfilled for the projects. An overview of 15 NSBT funded project showed that three projects had partners from all five Nordic countries, although some project objectives aimed at certain Nordic members like PROACTIVE, the subject did not necessitate cross-Nordic representation and could be covered by fewer partners, or the call topic was not a priority of the country.

Furthermore, NI could ensure that projects and activities are run in best possible manner, that **projects are sustainably managed**. This was the case with NCH as it lacked a project management structure at the beginning which NI pointed out. While NI is seen as ‘less bureaucratic’, compared to the European Commission, and ‘easy to work with’, NI could still set some level of critical control points or criteria for the activities and projects, to ensure the best outcome and ‘value for money’.

NI can also **ensure cross-linking of projects and project results** within programs as well as between programs and programming periods to **capitalize on achieved results**. For instance, NCH has a connection to the *Nordic Transition Partnership for Climate Neutral Cities 2030 (NTP)* project, however there are other NSBT funded projects and activities that are relevant like LOOP Ventures and *Circular Business Models in the Nordic Manufacturing Industry*. And in the new programming period with the eight new programs, how can NCH, for instance, be connected to the *Circular Business Model* and the *Sustainable Construction* program?

If we look at the NI criteria for funding activities, two of the funding criteria, *Nordic added value and additionality* and *Wider understanding of Nordic impacts*, can be directly linked to the Nordic vision. In other words, NI can select and fund projects and activities that contribute the best towards the vision. The table below takes a closer look at NCH to see how well it fulfils these, with some examples of other NSBT funded projects indicated where applicable. We have also seen that NI has funded single activities that can have a significant impact on the vision. For instance, the Nordic Circular Arena or the Nordic Circular Economy Playbook.

Table 2: Nordic Innovation activity funding criteria

Funding criteria:	Nordic Circular Hotspot	Other project examples
Nordic added value and additionality		
<ul style="list-style-type: none"> Nordic Innovation’s activities are to promote cooperation between stakeholders in multiple Nordic countries. 	Started with three managing partners from three Nordic countries. At time of writing, there are managing partners representing all Nordic countries. A new partner program will allow stakeholders to become (paying) members of NCH	Nordic Circular Hubs; Platform Economy; Circular Business Models in the Nordic Manufacturing Industry - Ecosystem Perspective; Nordic Transition Partnership for Climate Neutral Cities 2030 (NTP); PROACTIVE ...
<ul style="list-style-type: none"> Cooperation across national borders creates new synergies and leads to greater benefits than each country can obtain individually 	Nordic Circular Hotspot would not have been possible without NI funding.	Nordic Circular Hubs; Platform Economy; Circular Business Models in the Nordic Manufacturing Industry - Ecosystem Perspective; Nordic Transition

Funding criteria:	Nordic Circular Hotspot	Other project examples
		Partnership for Climate Neutral Cities 2030 (NTP); PROACTIVE ...
<ul style="list-style-type: none"> Nordic Innovation seeks activities which encourage results that would not otherwise be possible. 	Activities of NCH create a Nordic platform that represent Nordic values	Nordic Circular Hubs; Platform Economy; Circular Business Models in the Nordic Manufacturing Industry - Ecosystem Perspective; Nordic Transition Partnership for Climate Neutral Cities 2030 (NTP);
<p>SMEs - Nordic Innovation's activities are specially targeted towards SMEs.</p>	Nordic Circular Hotspot was founded by partners that are SMEs. SMEs can also become members of Nordic Circular Partner.	LOOP Ventures pilot; NSRS - Nordic Standard Sustainability Reporting for SMEs (indirectly); Metal Waste Reduction in Tinsmith Workshops in the Nordic Countries
<p>External co-funding - Funding activities by Nordic Innovation are required to have external co-funding as well. Co-funding may come from the participating companies, from clusters or from national organizations.</p>	Only once under the first phase (Vinnova) of the project. The partnership program is intended to bring in funding.	-
<p>Wider understanding of Nordic impacts - Nordic Innovation gives priority to activities that promote a wider understanding of the positive impacts of Nordic cooperation.</p>	Is all about bringing stakeholders across the Nordic region together. All activities have a Nordic perspective: Nordic Circular Partner, Nordic Circular Arena, Nordic Circular Summit.	Nordic Circular Hubs; Platform Economy; Circular Business Models in the Nordic Manufacturing Industry - Ecosystem Perspective; Nordic Transition Partnership for Climate Neutral Cities 2030 (NTP);
<p>Self-financing after project period - All activities are to be self-financed after the project period has been completed.</p>	A new partner program has been launched that will help to fund the activities.	-
<p>State aid - It is a requirement that all grants from Nordic Innovation comply with the aid rules of the European Union and the Agreement on the European Economic Area (The EEA Agreement).</p>	Complies	-

Source: based on <https://www.nordicinnovation.org/what-we-support>

Besides the issue of lack of clear measurable targets, another major challenges with the NSBT vision and Vision 2030 becoming achievable, is the need for **national political support and involvement** as implementing circular economy will require changes on a broad front at the same time:

“To achieve fundamental social change, a circular economy must be advanced by governments in a coordinated manner with sufficient resources allocated to support the change.” (Herlevi, 2020)

To create a Nordic circular market, there is a need to overcome a range of barriers: regulatory & political; economic; technological; structural; and knowledge and cultural. For instance, if a company in Denmark cannot import a certain type of waste from Sweden that it needs for a circular product, then this is a barrier to a Nordic circular market. Or the other way around, if one Nordic country introduces measures that promotes circular activity practises, like the lowering of VAT in Sweden for products that are repaired, then this should be implemented across the Nordics too. Optimally, a **committee** or **advisory board on circular economy** under the chair of NI or NCH, with other relevant stakeholders not part of NCH and Nordic government representatives could be created, using the Danish Advisory Board for Circular Economy as a model. This would create a direct communication channel to national governments. As neutral stakeholder, NI could propose this activity as it would help to speed up the move towards the vision. But it would need to receive funding that secure its work until 2030.

Other activities NI can fund are **studies and reports that look into bottle necks, tools and best practises**. After all, the NSBT Annual Action plan 2020 mentions as an assumption that bottlenecks and barriers are to be mapped. There are also good examples of these types of reports produced by the NCM, like the ‘Kreutzer report’ on integrated and effective Nordic ecosystem for innovation and green growth²⁰ or the *Circular economy in the Nordic construction sector - Identification and assessment of potential policy instruments that can accelerate a transition toward a circular economy*²¹. Add to this the number of circular economy reports that have been prepared across the Nordics, like *The opportunities of a circular economy for Finland* (2015)²² and the *Study for a National Strategy for Circular Economy* [in Norway]²³. To quote from the Nordic Innovation Annual Report 2020:

“We are aware that the individual projects or programmes are by themselves insufficient to generate the longer term ‘real impact’ aspired to by the Nordic Ministers. Rather, they are likely to act as catalyzers or sparks of inspiration on which Nordic stakeholders can build, scale and further develop co-operation and Nordic wide ecosystems”.

This is what NI does best, to catalyse or activate stakeholders across the Nordics, to come together and collaborate around issues that can contribute to move towards the vision. However, it would be important that NI takes into consideration if there is a possibility for Nordic stakeholders to build, scale and further develop cooperation after the project has ended, that it creates sustainable impact.

Further, it should be considered that a project could apply for continuation funding or targeted funding for specific activities in the next programming period to allow for sustainable (mid- to long-term) impact, if the nature of the project does not allow to secure other financing, i.e., the ‘self-financing after project period’ criteria.

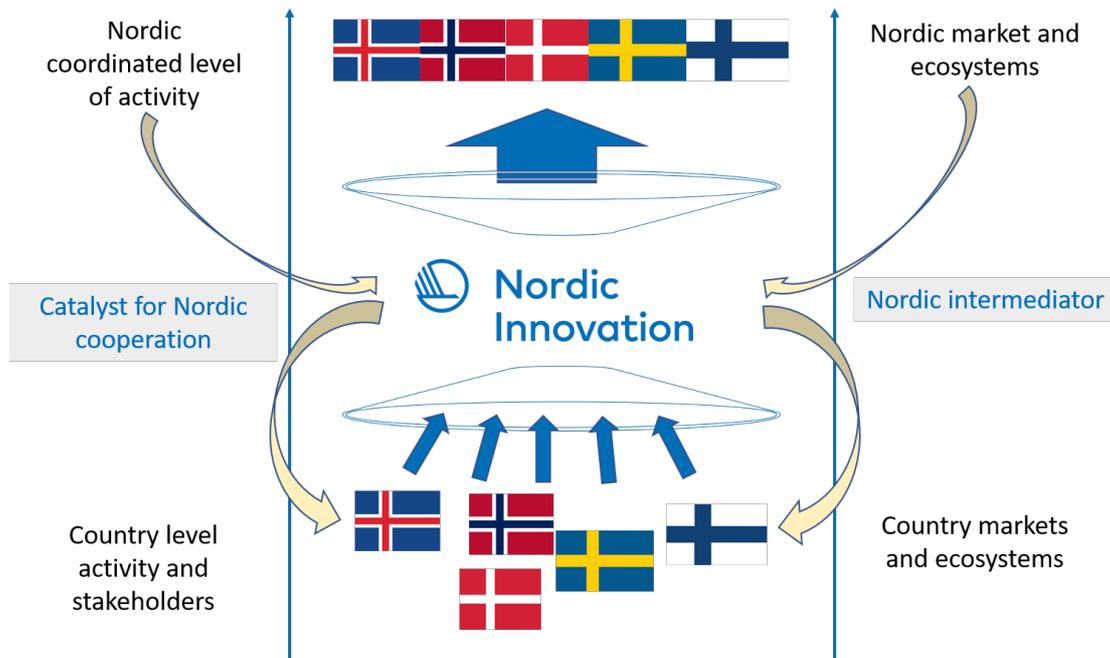
²⁰ <https://www.norden.org/en/publication/integrated-and-effective-nordic-ecosystem-innovation-and-green-growth-0>

²¹ <https://www.norden.org/en/publication/circular-economy-nordic-construction-sector>

²² <https://media.sitra.fi/2017/02/28142449/Selvityksia100.pdf>

²³ https://www.regjeringen.no/contentassets/7ca1a81f57cc4611a193570e80c4dafd/deloitte_study-on-circular-economy_short-summary.pdf

Figure 2: NI as a catalyser for Nordic cooperation and knowledge creation



Source: authors

5. Observations and considerations for the future program

- NCH should be officially endorsed by NCM and receive status similar to the Holland Circular Hotspot at Nordic level, and seen as 'THE' collaboration platform that connects all NI activities related to promote and support collaboration and knowledge exchange on Nordic circular economy.
- Better use of 'internal' Nordic knowledge, experience and best practices with circular economy implementation and transition.
- NI to ensure that there is wide representation of partners in projects and activities across the Nordics to ensure best Nordic Added value.
- Stronger connection between projects within programs and between programs where relevant for a circular economy transition, and also between programming periods to build upon achieved results.
- Need for a more holistic strategy to achieve the vision with committed support measures. Implementation of circular economy requires cross-sectoral cooperation at all levels with political support to be able to create a Nordic circular market. We are talking about cross-market segment, cross-economic sector and cross-regulatory silo collaboration.
- Need for indicators (KPIs) with targets, that are achievable to measure progress level.
- Thanks to its neutral and respected position in the Nordics, combined with its established network across the Nordic region, NI could help to 'beef' up NCH activities where necessary, by for instance recommending relevant stakeholders to projects and create connections.
- The Vision 2030 implies that there is political support on national level for the issue. However, many NCH partners felt that this support was missing or at least it is not clear at the moment. [If the NI

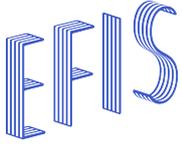
funded activities are the only ones driving the implementation of the vision, there is a risk that the vision will not be reached.]

- Ensure activities that help to increase sustainability amongst SMEs. As the report ‘Nordea Business Insight Report 2019’ states: “The bigger the company, the more integrated is sustainability into their operations ... Large sized companies have to a higher extent incorporated sustainability into their operations, strategically as well as operationally.” (Nordea, 2020)
- Create a State of the Nordic Region in circular economy that is regularly updated to measure progress towards the Vision, similar to State of the Nordic Region 2020 report²⁴.

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²⁴ <https://nordregio.org/publications/state-of-the-nordic-region-2020/>

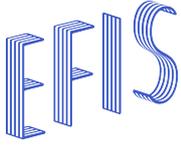


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Lessons from the Nordic Smart Mobility and Connectivity (NSMC) – impact at a system level

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1. Introduction

This case study is focused on learning from the portfolio of **Nordic Smart Mobility and Connectivity (NSCM)** projects. The case study adopts a process driven (formative) evaluation approach to help Nordic stakeholders see how the program outcome or impact has been (or can be expected to be in the future) achieved. The case study is based on interviews and an evidence review for five out of eight projects funded following calls for projects in 2019 and 2020 which sought to address two topics:

Seamless, integrated and people-centric mobility.

- Sustainable Insights : Measure, Inform, Mobilise (MIM)
- Nordic Open Mobility and Digitalisation (NOMAD)

Sustainable, secure, energy-efficient and decarbonised mobility:

- Nordic Network for Electric Aviation (NEA)
- The Connected Ship
- Next Nordic Green Transport Wave - Large Vehicle

As well as four out of five of the preliminary projects funded by the Sea meet Lands Mobility mission:

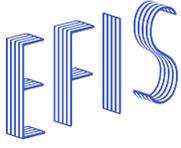
- Zero Emission Energy Distribution at Sea
- Nordic Green Ammonia Powered Ships
- Onshore Power Supply in the Nordic Region,
- Maritime Energy Transition

These projects were selected for interview based on their state of progress, following consultation with the NI advisors. Insights from other related projects were considered when relevant and available based on documentary evidence.

The nine projects reviewed brought together (at the application stage) 72 partners, of which 21 from Sweden, 18 from Norway, 17 from Denmark and 11 from Finland, 2 from Iceland and 1 from Greenland, plus two Nordic level actors. The partnership scale ranges from 4 (MIM and MAREN) to 12 (the Connected Ship) and 15 (NEA) with an average of 8 partners per project. The project partners range from small digital companies to some of the largest companies in the mobility field in the Nordic region; and from specialised business associations, cluster organisations to research institutes and university teams.

2. Brief history and contextual setting

Transition to more sustainable mobility is a topic of relatively high importance in all the Nordic countries. As outlined in the program documents mobility is a broader concept than transport: “Transport should be viewed as a function or an activity within a wider mobility system that consist of many interlinked and interdependent components, making it possible for us to move people and goods around.” Mobility is viewed as critical in achieving the goal of making the Nordic region “the most integrated and sustainable region in the world”. Sustainable mobility refers to “emission-free, carbon-neutral and even environmentally friendly mobility, with decarbonising as a first step”. Given its high proportion of total greenhouse gas emissions, the goal of at least -55% greenhouse gas reduction target by 2030 and of climate neutrality by 2050 will be reached, only by more ambitious policies to reduce transport’s reliance on fossil fuels in line with zero emission goals.



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The Nordic region has specific mobility challenges in terms of the pattern of settlements dispersed across a large area complicated by natural geographical and weather conditions. This requires a broad network of land, sea and air transports to maintain vital connections. As the program documents underlines: “maintaining a people-centric focus is important. Future mobility solutions should be accessible, affordable, seamless and integrated, addressing people’s wants and needs”.

In line with the Nordic Council of Minister’s Vision 2030, during the period 2021–24, the Nordic priorities include strengthening promotion of innovative solutions that support carbon-neutrality and climate adaptation in the areas of transport energy; and digitalisation is viewed as a means to tie the Nordic region even more closely together (including through applications that facilitate mobility). More generally, integration of digital technologies, often trialled on land (e.g. smart city solutions) can provide enhanced fuel efficiency, etc. for the maritime sector.

The Nordic goals are reflected in the EU’s Sustainable and Smart Mobility Strategy published in December 2020²⁵ which sets the target to achieve a 90% reduction in the transport sector’s emissions by 2050. This long-term target, to be implemented by 10 key flagship actions, each with concrete measures, is given a nearer term reality by a set of milestones including by 2030: at least 30 million zero-emission cars will be in operation, scheduled collective travel for journeys under 500 km should be carbon neutral, automated mobility will be deployed at large scale and zero-emission marine vessels will be market-ready; and by 2035: zero-emission large aircraft will be market-ready.

To contribute to implementing such strategies and the overarching Green Deal, the EU’s new Horizon Europe (research and innovation) programme has also introduced missions which seek to help solve some of the greatest global challenges including adapting to climate change, protecting oceans and living in greener cities. Each mission operates as a portfolio of actions – such as research projects, policy measures or even legislative initiatives - to achieve a measurable goal that could not be achieved through individual actions.

At the national level in the Nordic countries, the governments have committed to various priorities with, for instance, Denmark, Finland, Norway and Sweden are all signed up to the Mission Innovation initiative. Norway is co-lead in the “Mission on Zero Emission Shipping” working with the other co-leads and participants, with a particular focus on possible low-emission propulsion technologies and solutions. In 2021, the Danish Government prioritise DKK 750 million for four missions focused on the challenges to move towards carbon neutrality by 2050, including using the abundance of wind energy for power “Power-to-X” technologies that can store or convert green electricity into green fuels. Finland is similarly focused on Power-to-X technology including different hydrogen solutions. It can be used to produce different raw-materials and products, such as synthetic methane, ammonia and even protein. The Nordic countries are also strongly involved in the full value chain from raw materials to battery production and urban mining and battery recycling (in a circular economy perspective) with companies like Northvolt, Sweden and Norsk Hydro making significant investments in new production capacity for battery technologies that can help power sustainable mobility²⁶.

The national innovation agencies all have activities focused on sustainable mobility including through the integration of digital technologies. For instance, in Sweden, one of Vinnova’s 10 areas for a sustainable future is ‘Sustainable mobility systems’ defined as ‘moving people and goods in a resource-efficient, fast and safe way while avoiding negative effects on the climate and our health. The focus is on innovations with a clear system perspective. In Finland, the global ecosystems policy is one example of an approach to building new

²⁵ See: <https://ec.europa.eu/transport/sites/default/files/2021-mobility-strategy-and-action-plan.pdf>

²⁶ See: <https://www.theexplorer.no/stories/energy/building-a-circular-battery-economy-in-norway>

cross-sectoral partnerships based on open innovation. As part of this ecosystem approach, Business Finland launched a challenge competition with the aim to challenge global leading companies to solve major future challenges. In Denmark, the 2020-2023 strategy identifies a number of economic areas of business and technology as the focus of publicly funded cluster organisations, with only one super-cluster per area including maritime transport and logistics. Across the Nordic, there is a trend towards policy driving the development of system wide solutions that are based on cross-technological and cross-sectoral partnerships and collaboration.

Interviewees from the projects underlined that the policy positions of the Nordic countries in fields such as shifting to alternative (zero-emission) fuels were often, but not always, front-runners that provide a framework and help set ambitions for a transition towards sustainable mobility and connectivity. In some cases, national target setting has helped drive the transition, for instance, the decision of Norway to ban cruise ships that are not emission free from the national fjords; the focus on Power-to-X in Denmark or aspirations to achieve zero emission air travel earlier than other parts of the globe.

The NSMC program set a broad direction with respect to identified challenges but was intentionally cross-sectoral and defined in an open manner to ‘allow for final concretisation and delimitation to take place at project level’. As was noted in internal working documents, *“by using broad definitions of the areas, Nordic Innovation takes into account technology development, innovation and changes that cannot be predicted today, at the same time as we want to stimulate innovation and cooperation across sectors and ecosystems”*. Under the NSMC program, in October 2018, NI launched two separate calls for ‘project outlines’ covering:

- Quality of Life Through Nordic Smart Mobility and Connectivity; and
- Clusters and Ecosystems as Drivers of Nordic Smart Mobility and Connectivity.

The intention of the call for project outlines was to give potential project partners the opportunity to form a viable consortium and develop a robust idea with considerable impact. Hence, the project outline call was a step in the program design process enabling a form of co-design by stakeholders following a process of taking stock (learning), analysis, data collection and analysis and consultations in the Nordic region. The project outlines were viewed from the NI perspective as a ‘tool’ to gather ideas for the program but also as a means to mobilise cooperation and interest with a view to receiving high-quality project proposals.

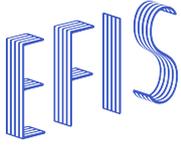
From these calls, 15 ‘stage one’ projects received funding of NOK 200,000. The stage 2 call in June 2019 (16m NOK allocated)²⁷ aimed to select projects for a next round of funding (although it was not a prerequisite to have participated to the project outlines call). The aim of the second round of funding (up to 4m NOK per project) was *“to speed up the transition to a more sustainable, innovative and connected mobile future, where quality of life and liveability is a cross-cutting aspiration”*. From 12 applications, four projects were selected: the Connected Ship, Next Nordic Green Transport Wave, NOMAD and NEA. A further four projects including MIM were then selected following an additional call issued in spring 2020²⁸.

A mission is defined as concrete target, an achievable step towards a grand challenge that contextualises projects. By setting the direction for a solution, missions do not specify how to achieve success. The right answers are not known in advance. Rather, missions stimulate the development of a range of different solutions to meet grand challenges and reward those actors willing to take risks and experiment²⁹. The **Sea**

²⁷ <https://www.nordicinnovation.org/nordicsmartmobilityandconnectivitycall>

²⁸ <https://www.nordicinnovation.org/programs/call-proposals-nordic-smart-mobility-and-connectivity-round-2>

²⁹ Mazzucato, M and Dibb, G. (2019). Missions: A beginner’s guide. UCL Institute for Innovation and Public Purpose, Policy Brief series (IIPP PB 09).



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Meets Land Mobility mission was launched in response to the objective for the maritime sector to reduce emissions by 50% by 2050. It has a budget of 8 million NOK and was defined as a means for the Nordics to team up across industries to meet a joint challenge and work together towards ambitious and shared goals. The Mobility Mission set a direction and sought to select a diverse portfolio of projects. The mission was scoped via workshops held in Gothenburg, Reykjavik and Turku in 2018 and 2019 and through collaboration with industry associations (e.g. Nor-Shipping) and expert interviews. The overall purpose of the Mobility Mission call was to foster Nordic projects “on decarbonization, new partnerships, value chains and/or business models in the field of Nordic Smart Mobility and Connectivity”. In particular, the topic was defined as ‘Decarbonising Nordic ports, transport of people and goods – on and between sea and land’. The five preliminary projects selected have the possibility to apply for main project funding for 2022-23 (minimum 50% co-funding).

3. Goals of the intervention

The NSMC Program’s main objective is to: **change the way people and goods are moved and increase the pace of the transition to more sustainable mobility solutions**. The 2020 programme report identified the results to be achieved (based on the performance grant letter) as:

- Mobilise Nordic innovation projects and new partnerships in mobility and connectivity, as well as contribute to cross-sectoral collaboration, new value chains and business models
- Identify cross-sectoral opportunities for the maritime sector in the face of land-based mobility
- Mobilise Nordic cities to collaborate on visions and solutions for mobility in the cities of the future
- Initiate measures to create value chain co-operation in Nordic and other markets with great potential for Nordic companies
- Contribute to EU synergies with Nordic consortia and partners for strengthening Nordic ecosystems and value chains.
- Strengthen co-operation between Nordic clusters and mobilize for joint innovation projects

Two specific indicators were mentioned in the programme report:

- Number of new Nordic solutions in the market generated by the program
- Number of new Nordic partnerships established through the program (total, across sectors, or value chains, between cluster/ecosystems)

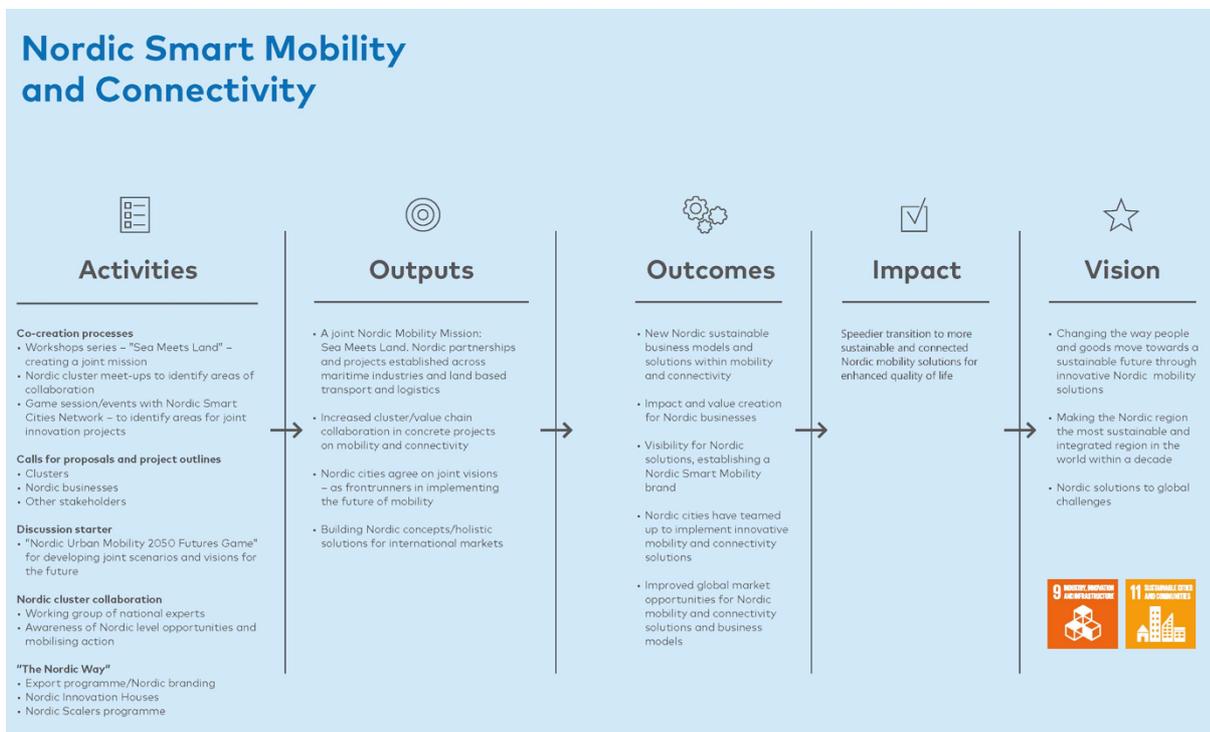
A key element of the eligibility of the projects (both the 2nd round calls and the Sea meets Land call) was to be at the TRL level 6 or above (technology demonstrated in relevant environment to actual system proven in operational environment). Moreover, the evaluation criteria for selection gave a strong emphasis (30%) to impact which was defined at different levels: business, Nordic (added value) and societal (sustainable development goals and the joint vision for Nordic cooperation, the latter for the 2020 call). Relevance was also examined with respect to the cross-sectoral nature of the innovation. These criteria translated into expected outcomes, with projects (2nd round call text 2020 and Sea meets Land call text 2020) expected to achieve one or more of the following outcomes:

- New Nordic sustainable business models and solutions within mobility and connectivity
- Impact and value creation for Nordic businesses
- Improved global market opportunities for Nordic mobility and connectivity solutions and business models

These elements were summarised in the program intervention logic diagram (see Figure 1). To further explore and develop this theory of change, a working session with the program advisors was organised resulting in the modified theory of change (see second figure on next page). The aim of this exercise was to help structure in a temporal dimension how the results achieved in the short term (during the project) can lead to the development of an ‘impact pathway’ with project results being leveraged to achieve medium term (e.g. 2025) effects of a greater scale and thus contributing to the long-term (2030) goals.

This temporal dimension seems important to keep in mind when exploring how the portfolio of projects may contribute to the longer-term vision and the question of the pathway to Nordic level impact was explored with interviewees (see next section).

Figure 1: NSMC theory of change



Source: Nordic Innovation annual report, 2019

Figure 2: Adapted program effects based on theory of change discussion with NI advisors

Short-term (end of project):
<ul style="list-style-type: none"> • Nordic partnership/critical mass of stakeholders mobilised on specific topics • Improved co-operation across existing value chains (e.g. shipping and mobile communications) • Scoping /feasibility studies completed as basis for deployment • Industrial scale solutions tested (e.g. ammonia powered ship, cross-border mobility apps) • Business model for broader system change established
Medium-term (2022-onwards):
<ul style="list-style-type: none"> • Joint visions and mission targets agreed by Nordic wide partnerships • Additional (follow-on) investment leveraged (public &/or private) for full-scale deployment • Market ready solution tested and ready for roll-out (e.g. electric short-haul airplane) • Promotion of Nordic expertise at global level and Nordic frontrunner role recognised in EU/global fora
Long-term (2025-onwards but variable depending on intervention):
<ul style="list-style-type: none"> • New sustainable mobility solutions begin to replace more environmentally damaging existing solutions (e.g. electric trucks replace diesel) • System wide transitions and reconfiguration of suppliers (e.g. municipal renewable electricity sources replace multinationals supplying aviation fuel at regional airports) • Quantifiable reduction in environmental impact of mobility (e.g. electric aviation for all short-haul flights in Nordic shipping, green ammonia shipping replaces fossil fuel powered ships, on shore renewable power supply in ports replaces fossil fuel power on ship in all Nordic ports, etc.) • Quantifiable increase in Nordic exports in specific sustainable mobility solutions

Key elements arising from the working session concerning the ‘impact pathway’ from project to long-term impact included:

- Involving users, whether individuals or industrial end users, in the process from the earliest stage;
- Enhancing cooperation within and across value chain in order to bring together a critical mass of actors that can drive transition in the topic areas;
- A focus on workable business models in these new and emerging fields which are disruptive to existing value chains and business model
- The need to develop joint visions that are shared across the region;
- Assuring continuity of funding (whether from NI or by leveraging follow-on funding).

However, the precise impact pathways between the portfolio of projects and the overall NSCM impact objective and the vision as expressed in the programme theory of change were more difficult to trace. By reviewing the projects, this case study explores this question of the potential contribution of the projects to driving the expected transition.

The projects covered in the case study provide an overview of different elements of the Nordic ecosystem in the NSMC field with a strong emphasis on a shift to ‘zero emissions’ through the testing of and rollout of alternative fuels and the transition of transport related energy infrastructure, both on sea and on land. The projects also address the opportunities provided by the application of data solutions and connectivity to drive personal mobility and improve (environmental) efficiency of transport (maritime, land).

During preparation of this case study, the NI advisors noted that their aim was to pick the best projects and the best consortia amongst the applicants “without a pre-defined idea of how they should be organised or what their main focus should be. The call/mission texts define a framework and overall objectives”. This was confirmed by interviewees who stressed that they were encouraged to be ambitious : *“in their approach NI adopt a very good balance between solving practical problems and aiming at the bigger picture. NI pushed us to go for what was probably our 4th option, the most difficult but also the one with the highest potential value”*.

In many respects, the projects can be viewed from a **system innovation** (SI) perspective: in SI change is profound and far reaching; it leads to the evolution or emergence of new actors, redefines old relationships and may create new markets and it needs to be conceptualised in a horizon of one or more decades. The analytical framework for SI is demarcated by the sum of all innovations, radical and incremental, social and technological that combined bring about the transition³⁰.

A number of the projects seek to foster (or at least contribute) to a SI with interviewees stressing that in many cases ‘technology is not the issue’ rather bringing together the relevant group of players covering different elements of an emerging value chain to share knowledge openly, build trust and prove the business case is more important. This is evident in the projects addressing the introduction of new fuels into existing maritime, land and air value chains: *“The big challenge is the business case, there is a chicken and egg question, can we build and launch this vessel if we are not sure of the fuel costs over its lifetime and why should we develop the fuel if we don’t have any ships to uptake it”*.

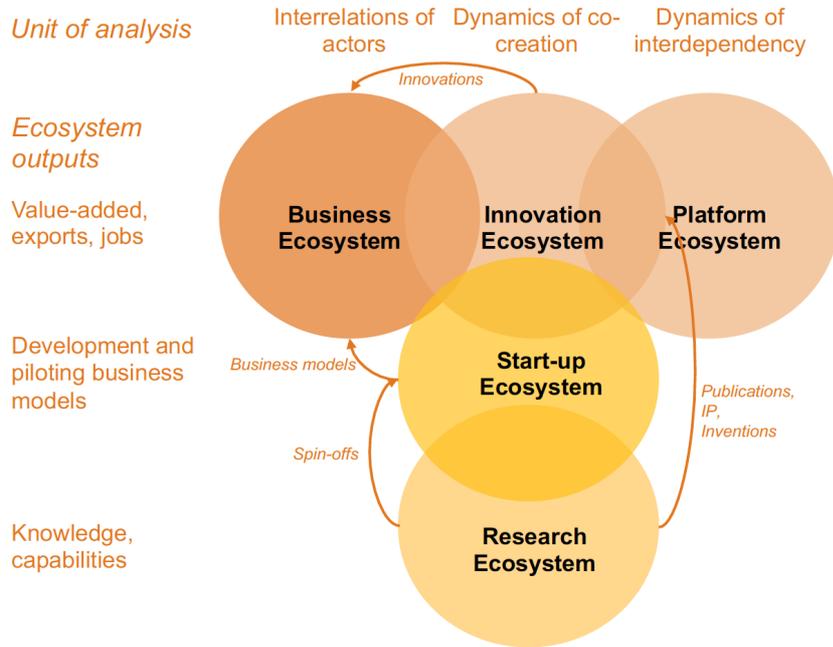
During the interviews, the word ecosystem was spontaneously used by participants to describe their efforts to build new or reinforce existing alliances across the Nordic region. In the literature several different types of ecosystems ‘co-exist’ as illustrated below. The Some common characteristics for ecosystems include:

- Global and inter-regional nature
- Blurring of industry and sector borders
- Dynamic interaction and co-opetition
- Common goals, interests and values
- Self-directing and regulating, distributed responsibilities and decision-making
- Open knowledge exchange
- Adaptability to new environments
- End-users/customers have an active part in value creation

A number, but not all, of the selected (preliminary) projects exhibit such characteristics with a strong emphasis on driving new cross sectoral/industry alignments (smart city technologies for maritime solutions), distributed responsibilities and open knowledge exchange. The need to involve all actors, e.g. from energy providers, ports to ship owners, in a collaborative co-creation process was stressed.

³⁰ See: <https://www.oecd.org/sti/inno/governanceofinnovationsystemsvol1synthesisreport.htm>

Figure 3: different types of ecosystems



Source: Piirainen et al (2020) *Impact Study: World-class Ecosystems in the Finnish Economy, Part A*.

Innovation ecosystems facilitate the collective generation of system-level outputs, in the sense that the heterogeneous community collectively generates an output that is greater than any single participant could deliver alone³¹. This is an important point to keep in mind when assessing the results of the NI funded projects. The majority of interviewees stressed the differential development across the Nordic countries in their topic area, with some national ‘ecosystems’ leading on specific solutions or applications or technological developments in the sustainable mobility or connectivity field (e.g. in the Connected Ship case Swedish IT expertise is being tested in Danish maritime sector). Moreover, the projects generate new forms of disruption by bringing major ‘traditional’ (e.g. energy or shipping) companies together with new smaller or more entrepreneurial players that incite the traditional players to rethink their own business models. This can even lead to new joint ventures (as was underlined in the case of ZEEDS) between old (large) and new players, helping to speed up transition in slow-moving sectors.

³¹ Thomas, L. D. W., and E. Autio (2019), “Innovation ecosystems”, Oxford Research Encyclopaedia of Business and Management. Aldag, R. (Editor). UK: Oxford University Press

4. Results and potential long-term impact

Most of the projects reviewed are still in a relatively early phase of development. However, in many cases NI funding is complementary or additional to past results or work being done under public (regional, national, EU) or privately funded research and innovation projects. The table below provides a snapshot of the expected short term (end of project) and potential contribution to 2030

Figure 4 : overview of short and longer term effects of NCSM projects

Project Name	TRL level	Short term (end of project) results	Long term (2030 horizon) impact
MIM	6	Piloting mobility application at city level and testing business model	Unclear potential for scaling given limited scale of pilot and likelihood of being able to develop Nordic platform
NOMAD	6-8	Proof of concept and pilot testing of cross-border mobility application (federated mobility system)	Potentially scalable, however, legislative/regulatory issues to resolve plus questions over willingness of private sector providers to share data.
NEA	6	Proof of business model and development of technology for electric aviation	Significant potential impact on sustainable mobility goals, with 'anchor companies' involved and potential regional impact (local airports, energy providers). Positive impact on global market visibility of Nordic businesses.
The Connected Ship	6	Demonstrate a digitalisation platform on a ship and enhance (access to) data for ship owners (operators)	Potentially scalable given strong demand for enhanced marine connectivity. Expansion of market opportunities for Nordic IT providers in global maritime sector.
Next Wave	7-9	Scoping study for deployment of hydrogen powered large vehicles - value chain from energy providers to users.	Potential for contribution to decarbonisation of land transport, but technical, market and regulatory barriers to resolve.
NoGAPS	6-9	Proof of concept of World's first ammonia powered deep sea vessel	Significant potential for scalability and impact on zero-emission goals – clear potential synergies with ZEEDS.
On Shore Power Supply	9	Feasibility study for deployment of on-shore power supply and validation of business case	Driven by need to meet EU directive, standards in place, impact on reduction of pollution plus global market potential for Nordic suppliers

Project Name	TRL level	Short term (end of project) results	Long term (2030 horizon) impact
MAREN	7-9	Creating a Nordic cluster for maritime energy transition – identification of demonstration projects	Unclear at this stage - some potential to contribute to development of maritime renewable value chains.
ZEEDS	6	Fostering the application of industrially ready technology to prove the viability and generate a new Nordic value chain	Potentially major impact on contribution to zero-emission shipping and positioning of Nordic region in global context.

Source: authors based on project material and interviews

Building on the interviews and review of available deliverables from the projects helps provide insights into the comparative potential for the projects to generate the type of results expected in short- medium and long term.

In most cases, the projects are not generating radically new technological advances and where this is the case, the NI funding is additional to other national or EU funding (e.g. in electric aviation or zero-emission fuels). A common theme across the projects is to use the NI funding to prove and communicate to a broad set of actors on what can be done today to move towards and contribute to the transition: *“we decided to work on what can be done right now which means using available technology, test it and align it and combine knowledge from the portfolios of each partner and see how far we can go with today’s technology”*.

NI funding is viewed as giving the Nordic partners *“reputational credit and common money.”* For the interviewees, while the scale of funding is not significant in the greater scheme of things, the NI funding is seen as critical in providing a means to ‘oil’ the co-operation amongst Nordic actors who individually have elements of the required solution and therefore by bringing them together the NI project helps to foster a process of co-creation and to some extent ‘platform’ building (particularly the projects involving larger ‘anchor firms’). As an interviewee noted: *“The advantage is that otherwise we would have to go to the boards of the big organisations and ask for money, with the NI funding, we have been given a push to act, to be quick and just do it. I can just hire someone and get the work done”*.

In terms of sustainability of the impact generated (e.g., through enabling scalable of viable business models), the majority of projects indicated that they expected to maintain co-operation beyond the lifetime of the NI funding: *“We will go forward anyway, but the funding has been really important for us, and when NI see that things are moving they should stay with the project for a longer time and lift us higher”*.

The key barrier to sustainability is rarely seen to be technological, rather the issue tends to be twofold: proving the business case to encourage first mover investment along the value chain; and that regulatory and procedural barriers are lifted in a harmonised way across the Nordic region to enable scaling. A number of the projects seek to foster this first mover investment impact including NEA, ZEEDS, NoGAPS through the proof of concept work being done and to some extent Next Wave, on shore power supply and MAREN. The latter three’s potential impact on first mover investment is less clear since it requires the roll out of distributed infrastructure (hydrogen fuelling stations, port infrastructure, etc.) where the business case depends on network effects.

Interviewees stressed that NI should seek to capitalise on the knowledge generated to make sure that businesses and public authority work together on regulations and decisions needed at both Nordic and

national levels. There was a view that more could be done to give the project results visibility (including at ministerial level) and share methodology and ways of working: for example, *“to use the learning in other sectors such as agriculture or building industry with electrification of construction equipment”*.

At the broad political level, there is also a proof-of-concept effect: *“it’s coming, we are going to do it”*. The projects are viewed as being able to send a positive signalling effect, developing frameworks, etc. This can include communicating on elements of the business model that contribute nuance to the political goals, such as the phasing in of zero emission solutions during a transition period.

5. Key learning takeaways and considerations for future programs

The case study of the NSMC projects provides a number of key learnings for future programming:

- The projects are generally focused on proving the business case for the deployment of solutions and technologies that are (largely) proven but may still require some adaptation before roll-out or scaling up. In most cases, the issue is not technology readiness but business case readiness. Nordic co-operation by ensuring a common drive to create the infrastructure (open data, energy supply, ports, etc.) or by supporting ‘first-mover’ cases (emission free vessels) can help resolve the ‘chicken or egg’ question.
- The topic of regulatory frameworks (including standards and certification) and the extent to which policy and politicians are providing certainty to investors arises. National policy declarations setting ambitious targets, public investment or tax measures, standards setting and regulatory harmonisation (e.g. for cross-border mobility) are all examples given by interviewees. Hydrogen (and more generally power-2-x) strategies and policies is an area where there seems to be potential for greater alignment in support of the deployment of innovative solutions, notably larger vehicles on land.
- The mobility transition requires cross-sectoral interaction that to be successful will generate new value chains. In many cases, these value chains will originate nationally but to be complete almost always require Nordic level business to business co-operation. The Nordic added value is much clearer for these cases where a leading group of business/innovation/public players are aligning their efforts towards the emergence of new value chains.
- In contrast, projects that are less ambitious (network development, missing larger or anchor companies) or ‘small scale’ appear to offer less obvious value added to the NI portfolio. The MIM and the MAREN projects are two examples from the current portfolio. The level of ambition of projects should be more clearly considered for future funding rounds. Funding smaller projects may still be justified, if they serve as a proof-of-concept for other larger scale initiatives.