

THE PRACTICES OF CHALLENGE-DRIVEN INNOVATION: CHALLENGE DESIGN, IMPLEMENTATION, EVALUATION, AND FUNDING

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This report contributes to the ongoing discussion about challenge-driven innovation by scrutinising the practices that underpin the emerging policymaking framework. By examining practitioner experiences of the practical implementation of challenge-driven innovation, several central tensions and trade-offs that organisers of initiatives are confronted with have been identified.

We encourage policymakers to discuss and make explicit the ways that they manage the potential trade-offs.

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Sitra working paper

**The practices of challenge-driven innovation:
Challenge design, implementation, evaluation,
and funding**

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Contents

Summary	4
Tiivistelmä	5
Sammanfattning	6
Foreword	7
Part 1: Introduction, context, and methodology	8
1 Introduction	9
2 Moving beyond welfare state bureaucracy?	11
3 Mission-washing or genuine reform?	12
4 Beyond experimentation? Recent policy developments in Finland	14
5 Our approach to studying the practices of challenge-driven innovation	16
Part 2: Empirical findings and analysis	20
6 What is challenge-driven innovation, and when should you apply it? Exploring practitioner rationales for embracing challenge-driven innovation	21
7 Designing, implementing, evaluating, and funding challenge-driven policies	25
7.1 Challenge design: How should a challenge be set and by whom?	26
7.2 Implementation: How should participants in a challenge-driven initiative be supported?	30
7.3 Evaluation: How should the success of a challenge-driven initiative be evaluated?	34
7.4 How should challenge-driven initiatives be funded and by whom?	37
Part 3: Where next?	39
8 Continuity, and current barriers to transformative change	40
9 Conclusion: Critical questions for future research and practice	42
Bibliography	43

Summary

In the current world situation, more effective means, methods and solutions are needed to solve societal problems and challenges. Challenge-driven innovation is one of the most talked-about ways of achieving systemic change in recent years.

This working paper describes the tensions of challenge-driven innovation policy, as well as various trade-offs, which are negotiated in the planning, implementation, evaluation and financing of initiatives.

Drawing on interviews and theoretical knowledge, the working paper focuses on the practices observed in challenge-driven (or mission-oriented) innovation activities.

For the report, the organisers' experiences of the practical implementation of challenge-oriented innovation have been studied, and the key tensions they face have been identified.

In addition, the publication discusses various compromises or negotiations that both those who run initiatives and those who decide on them face when promoting challenge-driven innovation.

A central conclusion of the report is that there is no one right way to promote challenge-driven innovation. Instead, decision-makers should be encouraged to discuss and highlight the methods they use when devising challenge-driven policies. Innovation is a process in which numerous value-based choices are made, which have an impact on how and what kind of innovations are supported.

The transparency of decision-making is one way to promote responsibility towards citizens and other stakeholders. The publication highlights four critical questions for future research and practice of challenge-driven innovation.

Tiivistelmä

Nykyisessä maailmatilanteessa yhteiskunnallisten ongelmien ja haasteiden ratkaisemiseen tarvitaan entistä vaikuttavampia keinoja, menetelmiä ja ratkaisuja. Haastelähtöinen innovaatiotoiminta on yksi viime vuosien puhutuimmista keinoista systeemisen muutoksen tekemisessä.

Tässä työpaperissa kuvataan haastelähtöisen innovaatiotoiminnan ja -politiikan jännitteitä (*tensions*) sekä erilaisia kompromissien tai vaihtokaupan kohteita (*trade-offs*), joista innovaatioiden suunnittelussa, toteutuksessa, arvioinnissa ja rahoittamisessa neuvotellaan.

Työpaperissa keskitytään haastattelujen ja teorian avulla haaste- (tai missio-) lähtöisessä innovaatiotoiminnassa havaittuihin käytäntöihin suhteessa niiden pohjalta tehtyihin politiikkatoimiin.

Julkaisua varten on tutkittu toimijoiden omia kokemuksia haastelähtöisten innovaatioiden käytännön toteutuksesta sekä

tunnistettu keskeisiä heidän kohtaamiaan jännitteitä. Lisäksi julkaisussa käsitellään erilaisia kompromisseja tai kaupantekotilanteita, joihin sekä aloitteita tekevät että niistä päättävät joutuvat innovaatioita edistäessään.

Julkaisun kirjoittajien eräs johtopäätös on, ettei ole yhtä oikeaa tapaa edistää haastelähtöistä innovaatiotoimintaa, vaan päättäjiä tulee rohkaista keskustelemaan ja nostamaan esiin tapoja, joita he käyttävät innovaatiopolitiikkaa tehdessään. Innovaatioiden tekeminen on prosessi, jossa tehdään lukuisia arvopohjaisia valintoja, joilla on vaikutusta siihen, miten ja millaisia muutosvoimia haastevetoisilla aloitteilla saadaan aikaan.

Päätösten läpinäkyvyys on yksi tapa edistää vastuullisuutta kansalaisia ja muita sidosryhmiä kohtaan. Julkaisussa nostetaan esiin neljä kriittistä kysymystä, joista voi olla hyötyä tulevaisuudessa, kun haastelähtöistä innovaatiopolitiikkaa tutkitaan tai tehdään.

Sammanfattning

I det rådande världsläget behövs allt effektivare metoder, tillvägagångssätt och lösningar för de problem och utmaningar vårt samhälle idag ställs inför. En utmaningsbaserad innovationsverksamhet är en av de senaste årens mest omtalade metoder för att genomföra förändringar på systemnivå.

Denna rapport beskriver spänningar relaterade till den utmaningsbaserade innovationsverksamheten och -politiken som uppkommer när man planerar, genomför, utvärderar och finansierar innovationer. Genom intervjuer och teori fokuserar rapporten på praxis som observerats inom den utmaningsbaserade innovationsverksamheten.

För publikationen har vi undersökt aktörernas egna erfarenheter av att genomföra utmaningsbaserade innovationer i praktiken, samt identifierat väsentliga spänningar som de har mött. Dessutom behandlar publikationen olika kompromisser som både de som tar

initiativen och de som fattar beslut om dem möter när de främjar innovationer.

En av slutsatserna som rapporten för fram är att det inte finns endast ett korrekt sätt att främja en utmaningsbaserad innovationsverksamhet. Beslutsfattare borde i stället uppmuntras till diskussion och transparens gällande vilka metoder de använder när de utövar innovationspolitik eftersom många värdebaserade val görs under en innovationsprocess. Dessa val har konsekvenser för hurdan förändring de utmaningsbaserade innovationerna kan åstadkomma.

Transparenta beslut är en metod för att främja ansvarsfullhet gentemot medborgare och andra intressentgrupper. Slutligen lyfter rapporten fram fyra kritiska frågor som kan vara till nytta i framtiden både för forskare och beslutsfattare som utövar utmaningsbaserad innovationspolitik.

Foreword

We rarely set off on a journey without having a clear destination in mind. Sometimes the journey is full of surprises: you might need to take a detour or use several means of transport. However, your destination remains clear and worth striving for.

This is what challenge-driven innovation is about – goal-oriented development of new things, in other words, about the direction of innovation and impacts that are worth striving for when solving major societal problems.

Many national and multinational parties have adopted a challenge-driven approach as the starting point of their innovation activities. For example, the EU's Horizon innovation funding is currently being led on the basis of mission-oriented principles.

Sitra's societal training and impact work is placing an even stronger emphasis on the key questions regarding changemaking. In other words, what is the best way to promote change and what capabilities are required for it. Challenge-driven innovation is an approach which Sitra has utilised, among other things, in the Ratkaisu 100 (Solution 100) challenge prize competition in 2017 and in the currently ongoing Sitra Lab change programme. We believe that a clear, co-designed goal helps in choosing the right changemaking methods and measures.

This working paper is an important discussion opener in the field of challenge-driven innovation activities and policy. It aims to bridge the gap between theory and practice. Although challenge-driven innovation has gained success in recent years, many have expressed the need for practical tools which put theory into practice. Simultaneously, it is important to continuously develop approaches and learn from work already being carried out. For this reason, the practitioners' experiences, lessons learned and failures in the field of challenge-driven innovation activities are the foundation of this working paper.

A central goal of this working paper is to extend the study of challenge-driven approaches and methods beyond challenge prizes. The working paper is part of the research project of the same research team funded by Business Finland, who is one of the first funders in Finland to engage in exploring challenge-driven innovation in practice.

We hope that these practical lessons will benefit you and encourage you to experiment and get interested in the new ways of addressing societal problems.

Päivi Hirvola and Kalle Nieminen

Societal training

Sitra

Part 1: Introduction, context, and methodology

We start the report by discussing the theoretical background of challenge-driven innovation policy. We provide a review of challenge-driven innovation in Finland and introduce our approach to studying its practices.

1 Introduction

A growing awareness of grand challenges has led governments across the world to look for new rationales, approaches, and instruments to tackle societal problems. Even the globally lauded Finnish welfare state is now seen by some as out of date when it comes to addressing rapidly evolving, multifaceted, modern societal problems, from climate change to loneliness and increasing levels of alienation and political polarisation (Takala et al., 2020).

One framework through which a rethinking of existing approaches is currently taking place is challenge-driven innovation¹, which starts from the premise that rather than restricting themselves to a reactive role, governments must proactively shape and co-create markets. Proponents of challenge-driven innovation suggest that by setting well defined goals focused on addressing pressing societal concerns, policymakers have the opportunity to influence not just the rate of growth, but also its direction (Mazzucato, 2018a). In contrast to conventional science, technology, and innovation (STI) policy frameworks that usually start by identifying existing strengths in a sectoral or regional ecosystem in terms of job creation and skills, challenge-driven innovation starts by identifying the problems in need of solving. This proposed shift of emphasis places significant new demands on policymakers to be able to set concrete targets (referred to variously as goals, challenges, or missions) and mobilise a diverse set of stakeholders towards achieving them (Kattel and Mazzucato, 2018).

Despite major policy uptake of challenge-driven innovation in the past few years (Mazzucato, 2019, 2018b), a substantial knowledge gap currently exists between the framework's

desirability in theory and affordances in practice. Surprisingly little is known about the practices that underpin the emerging policy-making framework. To help address this gap, in this report we examine experiences of practical implementation of challenge-driven innovation initiatives in the Nordic welfare state context of Finland. Particularly since launching a program in 2015 to embrace experimentation in government, Finland has amassed significant experience of experimental approaches to policymaking (Experimental Finland, 2022). Drawing on a co-creation workshop with leading Finnish practitioners organised as a collaboration between Hanken School of Economics and the Finnish Innovation Fund Sitra in December 2021, complemented by 26 follow-up interviews, we seek to highlight the practices involved in designing, implementing, evaluating, and funding, challenge-driven policies.

In contrast to purely conceptual analyses, our report examines challenge-driven innovation in a diverse set of empirical contexts, from technological to social challenges, and a range of instruments, from challenge prizes to R&D policies and other government programs. By attending to experiences of practical implementation, we wish to contribute towards moving away from taking the label of challenge-driven innovation at face value, to studying empirically “when and under which circumstances [...] goal-oriented policy initiatives [are] effective in engendering the dynamics of change [...] which they seek to unleash” (Janssen et al., 2021, p. 440).

Despite increasing efforts to define challenge-driven innovation, much ambiguity

¹ We use the term challenge-driven innovation interchangeably with mission-oriented, transformative, problem-focused, goal-oriented, and phenomenon-based policy. We understand challenge-driven innovation broadly as a mode of development that can be applied in different contexts and through different instruments, including, but not limited to: Industrial strategies, public procurement, research and development, and prize schemes.

currently surrounds the concept, opening up the possibility for a variety of interpretations. The central aim of our report is therefore to explore how challenge-driven innovation is both defined and made actionable by practitioners. Furthermore, we seek to make explicit the manifold values and aims that may be pursued through challenge-driven innovation, as well as the potential tensions and trade-offs between them (for a discussion about the role of values in policymaking, see for example Cairney and Oliver, 2017). Finally, we set out to examine what structures and capacities are currently missing in the Finnish innovation

ecosystem in order to reap the full benefits of challenge-driven innovation going forward.

This report forms the first output of the Business Finland funded research project “Towards an Entrepreneurial Welfare State? The Practices of Challenge-Driven Innovation Policies” launched at Hanken School of Economics in September 2021. The aim of Innovation and Growth Research funded by Business Finland is to find solutions to global challenges affecting Finnish economy and society. We hope that our report provides valuable inputs to both practitioners and researchers of challenge-driven innovation.

In contrast to conventional science, technology, and innovation (STI) policy frameworks that usually start by identifying existing strengths in a sectoral or regional ecosystem in terms of job creation and skills, challenge-driven innovation starts by identifying the problems in need of solving.

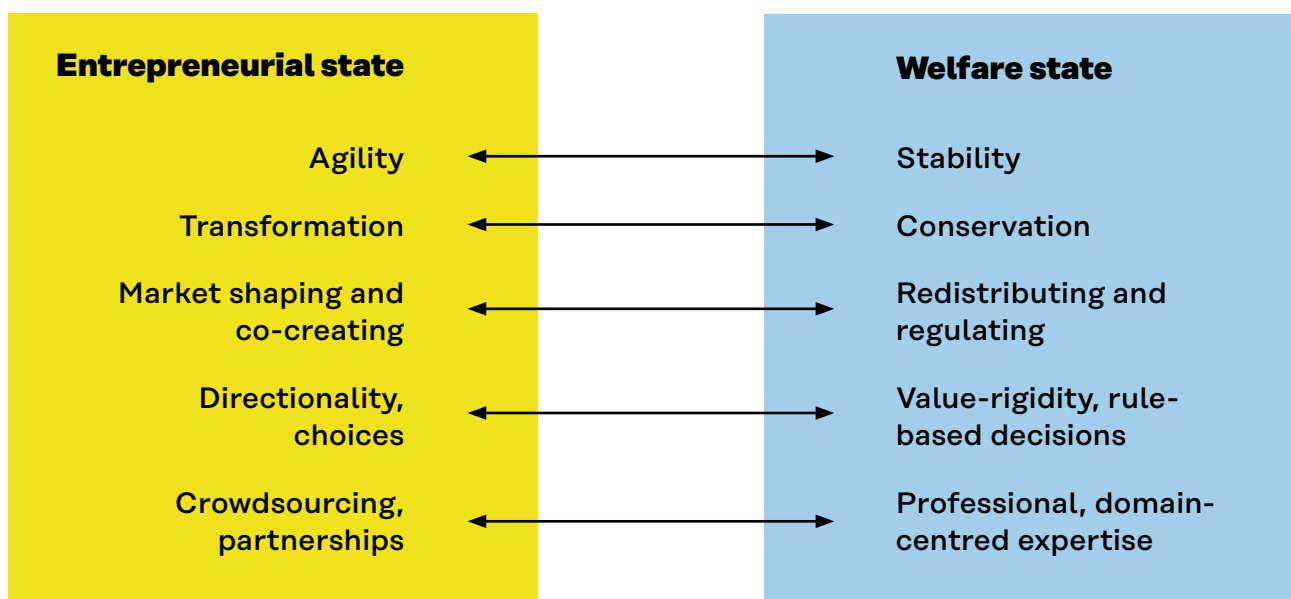
2 Moving beyond welfare state bureaucracy?

Despite a growing consensus around the need for what is variously called “challenge-driven” (Mazzucato et al., 2020), “transformative” (Schot and Steinmueller, 2018), “problem-oriented” (Mayne et al., 2020), “phenomenon-based” (Sitra, 2018) innovation policies, thus far the question of what practices underpin this approach to policy making-remains under-researched. Although public-sector reform has arguably always involved trade-offs between positive values (Peters, 2018; Simon, 1947), public sector organisations today face perhaps more conflicting demands than ever before. As Drechsler and Kattel (2020) note, on the one hand, public organisations are expected to have the ability to react rapidly to societal problems through agile and dynamic responses (e.g., in relation to the COVID-19 pandemic), and to shape the direction of innovation and markets.

On the other hand, public organisations are expected to carry out their traditional role as guarantors of long-term stability through rule-based and largely hierarchical operations.

A key concern for challenge-driven innovation thus relates to understanding the trade-offs involved in seeking to combine the traditional roles and functions of public bureaucracy with the idea of an agile public sector able to not only regulate and redistribute, but proactively shape and co-create markets. Figure 1 plots the positive, and to some extent conflicting, values of a challenge-driven, “entrepreneurial” versus traditional welfare state bureaucracy. We may posit that the initiatives included in our sample (table 2) represent leading Finnish efforts to enact an emerging governmental rationality focused on shaping and co-creating market and innovation outcomes.

Figure 1: Value tensions between “entrepreneurial” and welfare state bureaucracy



3 Mission-washing or genuine reform?

An increasing number of governmental actors are embracing challenge-driven innovation in the hope that it can help unite actors and resources around goals that otherwise are deemed unachievable, uncoordinated, or too slow. The framework is presented as a remedy to long-standing issues with conventional STI policy frameworks, as well as to problems in public administration more generally, from organisational inertia to siloed, hierarchical decision-making processes disconnected from the lived experiences of citizens. Apart from a select number of governmental bodies with high-level challenge-driven strategies (see for example, EU Missions in Horizon Europe;

German High-Tech Strategy 2025; Dutch Mission-oriented Topsector and Innovation Policy; UK Industrial Strategy Challenge Fund), many countries are still only looking into the possibility of adopting a challenge-driven agenda beyond single initiatives and instruments.

The growing interest in challenge-driven innovation has been accompanied by increasing scholarly and governmental efforts to define it. Table 1 highlights prominent existing definitions of mission-oriented innovation policies (which can be regarded as perhaps the most popular narrative of challenge-driven innovation at the moment).

Table 1: Prominent definitions of mission-oriented innovation policies

Definition	Source
<i>[...] 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.</i>	(Larrue, 2021, p. 15)
<i>[...] a directional policy that starts from the perspective of a societal problem, and focuses on the formulation and implementation of the goal-oriented strategy by acknowledging the degree of wickedness of the underlying challenge, and the active role of policy in ensuring coordinated action and legitimacy of both problems and innovative solutions across multiple actors.</i>	(Wanzenböck et al., 2020, p. 3)
<i>[...] an urgent strategic goal that requires transformative systems change directed towards overcoming a wicked societal problem.</i>	(Hekkert et al., 2020, p. 76)
<i>[...] systemic public policies that draw on frontier knowledge to attain specific goals, or 'big science deployed to meet big problems'.</i>	(Mazzucato, 2018a, p. 804)

In addition, various attempts have been made to differentiate between different types of challenge-driven policies. Wittmann et al. (2021), for example, distinguish between more specific, predominantly scientific/technological “accelerator” missions, and more open ended “transformational” missions focused on addressing societal problems, brought about by for example aging societies or the rapid advancement of artificial intelligence. Examining existing cases of mission implementation, the OECD (Larrue, 2021) distinguishes between overarching mission-oriented strategic frameworks; challenge-based programmes; ecosystem-based programmes; and mission-oriented thematic programmes. Wanzenböck et al. (2020), on their part, distinguish between problem-focused and solution-focused approaches to designing and implementing mission-oriented policies. In general, existing conceptualisations share a concern with the directionality of innovation (understood as the principle that innovation should not be pursued for the sake of economic growth only but should instead be aimed at addressing pressing societal challenges, such the United Nations Sustainable Development Goals), and an optimism, or sense of urgency, regarding the state’s ability to influence this directionality in a desirable manner.

The more efforts there are to arrive at clear definitions of challenge-driven innovation, the more ambiguity there seems to be surrounding the concept. The broad and varying conceptual starting points presented in table 1 are mirrored in existing operationalisations. The European Union, for example, has set a number of very different missions - from adapting to climate change, beating cancer, to building smart cities (European Commission, 2022). The immediate intuitiveness of challenges and missions can be viewed as a strength of the framework, as it helps to ensure interest and uptake. At the same time, however, conceptual openness and ambiguity carries the risk that a new label gets attached to such a wide variety of activities, that

it no longer is helpful in distinguishing between novel and conventional programmes. Should challenge-driven innovation become solely a high-level concept that is applied uncritically as a default answer irrespective of context, it could undermine its own transformative potential and help instead to legitimise existing practices and institutional logics (Janssen et al., 2021). This is the danger of mission-washing.

Conceptual ambiguity was identified as a concern also by the practitioners in our sample for this report. Public sector development was viewed as a particularly lively discursive space with a strong inclination towards adopting the latest fashionable concepts, without necessarily following them through with changes in practice. Many of our interviewees felt that a lack of clear definitions, and a tendency to attach novel labels to a wide variety of activities was resulting in concepts becoming watered down, as well as a general sense of confusion about the appropriate roles and responsibilities of different actors within initiatives. At worst, such confusion could undermine the mutual trust that was the pre-condition of any successful initiative, challenge-driven or other.

To move the debate on challenge-driven innovation forward, conceptual definitions must urgently be supplemented and enriched by scrutinising the practices that underpin the emerging policymaking framework (Haddad et al., 2022). Pre-existing research has highlighted the need to rethink how policies are designed, implemented, evaluated and funded in order to move from sectoral to challenge-driven policymaking (Borrás and Edler, 2020; Mayne et al., 2020; Mazzucato et al., 2020). By attending to practitioner experiences in the aforementioned key areas, we wish to contribute to not only forming an understanding of the practices associated with challenge-driven innovation, but to help qualify the framework in a more general sense: In what contexts, and in relation to what types of problems is challenge-driven innovation the appropriate response?

4 Beyond experimentation? Recent policy developments in Finland

In Finland, the recent uptake of challenge-driven innovation is part of a longer trajectory of reform of governmental practice. Particularly in the past decade, Finland has sought to establish itself as a leading country in public sector innovation. In 2015, the Finnish government launched as one of its core initiatives a program to embrace experimental methods and mindsets, with the aim of making testing, failing, and quick learning the new norms for public sector-led development (Experimental Finland, 2022).

With this goal in mind, the Prime Minister's Office set up an experimentation unit tasked with overseeing initiatives, such as the highly publicised universal basic income experiment, and promoting their wider application. Functioning as a component of the official government program, the feasibility of experimentation was put into a real-life test — one that it did not pass through unscathed. In some instances, experimentation became an excuse to dismiss new initiatives by saying: 'We tried that already, it does not work!' (Takala and Nieminen, 2020).

Regardless, experimentation remains an important tool in the Finnish public sector's toolkit. Arguably, however, the more lasting effect of the emphasis on experimentation over the past decade was that it paved the way for a debate about the necessity of redesigning the national innovation system. Systemic approaches to defining challenges, maximising impact, and fostering cross-sectoral partnerships are, at the level of discourse at least, now leading principles of public sector reform in Finland.

Some of our interviewees for this report situated challenge-driven innovation within the larger move towards experimental policy-making that began in Finland around 2015. One Senior Expert explained that at the time,

Finland was a relative latecomer in embracing challenge-driven innovation, falling behind countries such as the UK and US. In this period, challenge prizes and challenge-driven innovation more broadly offered a low threshold model to be embraced by organisations that wanted to try out new modes of development, both in the public and the private sector. Particularly since the pandemic, anticipatory and foresight approaches have gained increasing prominence in public sector development. Furthermore, discussions about the need for a digital green transition now occupies centre stage even in political debates, which was far from the case only a few years ago.

The Finnish Innovation Fund Sitra has arguably played a central role in promoting challenge-driven innovation in Finland in both theory and practice. Sitra's report on phenomenon-based public administration (2018), which sets out many of the same principles as the writings on challenge-driven innovation, received major uptake, leading to the terminology being adopted by many civil servants. Furthermore, Sitra's challenge prize *Ratkaisu 100*, organised in 2016-17 in celebration of Finland's centennial, was a major landmark initiative in applying challenge-driven innovation in practice. Sitra also commissioned a detailed evaluation of the challenge prize to take place both during and after the completion of the initiative. The resulting research reports (Toivonen et al., 2021, 2018) have acted as a guide to many prospective organisers of challenge-driven initiatives in Finland.

As a result of the aforementioned developments, challenge-driven innovation, alongside a number of other developmental frameworks, is currently receiving increasing attention amongst Finnish policymakers. Although challenge-driven innovation is not yet part of

any official government strategy, there are signs of growing uptake. For example, the promotion of a mission-orientated approach is listed as a central objective in the autumn 2021 update of the National Roadmap for Research, Development and Innovation Policy (Ministry of Education and Culture, 2022). In addition, a review of possibilities for a mission-oriented approach in Finland was selected as one of the government's analysis and assessment projects for 2022, the purpose of which is to provide research directly in support of governmental decision-making (Government's Analysis, Assessment and Research Activities, 2022). The state-owned innovation fund Business Finland has also recently launched its own version of the mission approach, with two pilot missions, one focusing on productivity growth through digitalisation and another on carbon neutrality (Business Finland, 2021). Even before these explicit missions, Business Finland has been one of the leading actors in applying challenge-driven innovation in practice in Finland (for a recent review, see Serger & Palmberg, 2022).

Drawing on the above, we may argue that the period from 2015 constituted the first wave of uptake of challenge-driven innovation in Finland, which manifested itself mainly as challenge prizes organised in a variety of contexts by a variety of actors. Arguably, however, we are now entering a second wave of uptake, whereby the possibility of challenge-driven innovation institutionalising beyond single initiatives and experiments is a very real prospect in the Finnish public sector at large.

...we are now entering a second wave of uptake, whereby the possibility of challenge-driven innovation institutionalising beyond single initiatives and experiments is a very real prospect in the Finnish public sector at large.

Example 1. Challenge-driven initiative

Business Finland's missions and leading companies funding (STI funding)

Business Finland is a public organisation funding research, development, and innovation, and it is one of the most central funding organisations of the Finnish state. Recently, it has adopted a challenge-driven approach in relation to two projects.

First, Business Finland launched a challenge-driven funding instrument, that is, funding for leading companies and their ecosystems, in 2020. This funding model has been organised as a challenge competition and is targeted at large Finnish companies. Moreover, this funding model supports ecosystem partners working towards the same mission. An interesting aspect of this funding model is that the question of what future mission should be addressed is outlined by the companies applying for the funding. In general, the projects propose to address future challenges and must have a significant impact on the national target to raise R&D intensity to 4% by 2030, and the employment rate target of 75% by 2023 set in the government programme.

Second, Business Finland launched a strategic mission-based approach in 2021 and has begun the work to align its overall strategy with missions. To kick-off this work, two pilot missions were launched: 'Digitalisation' and 'Zero Carbon Future'. These missions aim to speed up societal change as well as identify future market opportunities for Finnish companies. Business Finland's mission work is an example of applying challenge-driven innovation in the context of STI funding.

5 Our approach to studying the practices of challenge-driven innovation

This report explores practitioner experiences and viewpoints around challenge-driven innovation policy and practices in the Finnish context. Drawing on our earlier research on the challenge prize *Ratkaisu 100* (Takala et al., 2020; Toivonen et al., 2021, 2018); we identified relevant challenge-driven initiatives and organisations by means of snowball sampling. In addition, we used secondary sources, such as websites, social media posts and news articles to identify relevant interviewees. Table 2 summarises the initiatives and organisations included in this report.

Our sampling strategy was purposeful (Patton, 2015), in that we invited participants

who had experience of experimental innovation, challenge prize competitions, living labs, and public sector renewal, and could thus share their experiences of challenge-driven innovation implementation in practice. We adopted a broad definition of challenge-driven innovation and followed Larrue's (2021, p. 18) approach to include initiatives that allowed for learning about the challenges and opportunities of challenge-driven innovation. We included respondents from the public, private and third sector (see table 2) to generate a wide perspective on the topic. Our final sample included 27 practitioners who have organised a total of 15 challenge-driven initiatives since 2015.

Table 2: List of initiatives and organisations represented by the sample

Initiative	Year of initiation	Topic	Type	Sector
Initiative(s)				
Kokeileva Suomi (interviewee 3)	2015	Experimentation	Government programme	Public
Ratkaisu 100 (interviewee 1, 2, 7 and 25)	2016	Global expertise and capabilities	Challenge prize	Public
Helsinki challenge (interviewee 7)	2016	Science based idea-competition to reach SDGs	Challenge prize	Public
Vuosisadan rakentajat (interviewee 5 and 7)	2016	Wellbeing and societal participation among youths	Challenge prize	Third
Klash haastekilpailu (interviewee 18 and 21)	2017	Municipalities' service capacity	Challenge prize	Public
Peace innovation challenge (interviewee 5)	2018	Women's role in peacemaking	Challenge prize	Third
Lapsuuden rakentajat haastekilpailu (interviewee 17 and 20)	2019	Scalable digitalisation tools in child welfare	Challenge prize	Third
Sijaishuollon haastekisa (interviewee 11)	2020	Child welfare services involvement	Challenge prize	Third
Helsinki Energy Challenge (interviewee 14)	2020	Decarbonize heating system	Challenge prize	Public
Veturihanke (interviewee 10)	2020	STI investments	Innovation policy instrument	Public
Innovations for an equal future (interviewee 7)	2021	Inequality in education opportunities	Challenge prize	Third
Zero carbon and digitalisation mission (interviewee 9 and 23)	2021	Finland's future competencies	Operating model	Public
Kasvuportfolio-toimintamalli (interviewee 4 and 12)	2022	Finland's future competencies	Operating model	Public
Organisation(s)				
Forum Virium (interviewee 6)	2006	Experimentation in city context	Living lab	Public
6Aika (interviewee 16)	2014	Smart city coordination	Co-creation platform	Public
Finnish Climate Fund (interviewee 19)	2020	Finland's future competencies; reduce CO2 emissions	Public investment bank	Public
Demola (interviewee 9)	2011	Develop innovation ecosystem	Innovation platform	Private
Spinverse (formerly Industryhack) (interviewee 24)	n.a.	Co-creation projects with new partners	Co-creation consultancy	Private
Smart & Clean Foundation (interviewees 26 & 27)	2016	Substantially reduce CO2 emissions	Ecosystem orchestrator	Third
Other stakeholder(s)				
Green industry park (interviewee 22)	2021	Transformation from fossil to biobased raw materials	Development company	Third
Technology Industries of Finland (interviewee 15)	n.a.	Finland's future competencies	Interest group	Private
Innovestor (interviewee 13)	2014	Responsible investing	Investment company	Private

Our data collection consisted of a focus group workshop with 18 participants and 26 semi-structured interviews (see table 3). The focus group workshop was held as a Zoom meeting jointly organised by Sitra and Hanken in December 2021. Our participants had a “high experience level” (Pettigrew, 1990, p. 276) and we chose a responsible expert for each initiative. In designing the questions to be discussed, we sought to facilitate dialogue around challenge-driven innovation policy from the practitioner perspective. The workshop was divided into three parts and lasted two hours. First, a research presentation was held to introduce the topic of challenge-driven innovation policy. Second, participants were divided into four focus groups exploring the topics of 1) challenge design 2) implementation 3) evaluation and 4) funding. Participants were asked to

draw on their own practical experience and reflect on their process when discussing the topics. Finally, the workshop concluded with a joint discussion among all participants.

Following the focus group discussions, 32 practitioners (including all workshop participants) were invited to participate in semi-structured interviews. Out of these interview requests, a total of 26 interviews (with 27 participants) were conducted on Microsoft Teams between the end of January and beginning of February 2022. Each interview lasted between 46 to 67 minutes. The interview guide focused on how the concept of challenge-driven innovation can be understood, practical approaches to challenge design, implementation, evaluation, and funding, as well as potential risks and areas for further development.

Table 3: Overview of data collection and interviewees

Workshop participants	Semi-structured interviews
<p>Interviewee(s)</p> <ul style="list-style-type: none"> • Leading Specialist (x4) • Development Specialist • Ministerial Advisor • Director (x2) • Development manager (x2) • Vice president • Managing partner • Project Director • Innovation specialist (x2) • Business Development Manager • Senior adviser (x2) • Programme lead 	<ul style="list-style-type: none"> • Leading Specialist (x6) • Development Specialist • Ministerial Advisor • Director (x4) • Development manager (x2) • Vice president • Managing partner • Project Director • Innovation specialist (x2) • Business Development Manager • Senior adviser • Programme lead (x2) • Programme Manager • Executive director • Founder • Senior Expert (x2)
<p>Aim</p> <p>To gain a broad perspective and practitioner insights about the four thematic areas.</p>	<p>To obtain in-depth understanding of practitioners' experiences of implementing challenge-driven innovation.</p>

Both the focus group discussions and the semi-structured interviews were recorded and transcribed verbatim. The Nvivo software was used to facilitate thematic data analysis. The interview quotes were translated from Finnish to English, and we aimed at translating their meaning rather than literal form. Finally, a draft report produced by the authors was made available to the participants for comments, and their comments were incorporated in the final version.

Example 2. Challenge-driven initiative

The Strategic Research Council (research funding)

The Strategic Research Council (SRC) is an independent body established within the Academy of Finland that provides funding to solution-oriented, phenomenon-driven and programme-based research. Each year, the SRC prepares a proposal on key strategic research themes and priorities to be approved by the Finnish Government. The Government decides the final themes, which the SRC then formulates into research programmes. The projects to be funded must be of a high scientific standard and have societal relevance and impact. An important element of strategic research is the interaction between researchers and knowledge users throughout the projects. The aim of the funding granted for strategic research is to find solutions to major societal challenges and problems. (SRC, 2021). SRC is an example of challenge-driven research funding, where the thematic calls are derived from the government programme.

Part 2: Empirical findings and analysis

In this part of the report, we explore how practitioners understand challenge-driven innovation, its opportunities and risks, and we unpack their viewpoints on designing, implementing, evaluating, and funding challenge-driven initiatives. We refer to participants in initiatives, such as individuals, small teams, start-ups, and companies, variously as participants or solvers (a term adopted by some organisers).

6 What is challenge-driven innovation, and when should you apply it? Exploring practitioner rationales for embracing challenge-driven innovation

Not simply a tool, but a novel mindset of development

Similarly to the scholarly and governmental debates reviewed earlier (section 3), no single definition of challenge-driven innovation was shared by the practitioners in our sample. Many spoke interchangeably of challenges, missions, phenomenon-based thinking, and transformative innovation. Other key concepts that featured prominently were future-orientation, human-centricity, collective impact, open and citizen science, co-creation, and design thinking. Although a handful of practitioners had not come across the term challenge-driven innovation previously, everyone recognised the phenomenon.

Despite the absence of a single shared definition, many practitioners emphasised that challenge-driven innovation, and the experimental culture that it was part of, should be understood not simply as tools, but as mindsets of development with particular aims. Whereas previously problems and solutions had been defined largely by a select number of established experts, challenge-driven innovation came with the promise of opening up both the problem formulation and solution development spaces to a wider range of stakeholders. The following quote illustrates this view of challenge-driven innovation:

A major misconception, or thing that is taken for granted, is that experiments and challenge competitions are tools. But they are not just tools, they are ways of thinking about how to solve problems, and what

constitute social problems in the first place [...] Is it even possible to tackle big societal issues by bringing the recognised experts in, or is something more required. (Interviewee 5; Senior Expert)

When to apply challenge-driven innovation?

This emerging mindset was seen as being particularly well-suited to problems that required multiple complementary solutions, and for which a clear solution was not yet available or known. In circumstances where a clear idea of the solution did exist, traditional procurement processes constituted a better approach.

If the answer can be bought directly off the shelf, so to speak, then it's better to organise a traditional bidding process. However, if the question is larger, then a challenge-driven approach is needed. (Interviewee 14; Project Director)

At the same time, many practitioners emphasised that challenge-driven innovation could be helpful in identifying and tying scattered, already existing innovations more clearly around well-defined societal issues. Practitioners mentioned many fields, such as education, where although much innovation had taken place in the past few years, too often these innovations remained largely disconnected from the broader systemic challenges.

Finland is packed with school innovators, we have the best teachers in the world, many of whom are eager to develop new approaches

in their classrooms [...] However, the question that rarely gets asked is what problems are those innovations trying to address, and how might it connect to a broader issue around, for example, young people dropping out of school. (Interviewee 2, Leading Specialist)

Some saw the official government program as an important area of potential future application (see challenge-driven initiative example 5 for one example). Challenges, set by an elected government, would enjoy strong democratic legitimacy. Although existing government programs often included clear and well-defined goals, they usually did not say much about the developmental paths required to reach them. A challenge-driven approach, applied at the level of the national government, could help to ensure clearer targets, and better policy coordination between actors. This view is illustrated by the following quote:

[...] if we look at the government program [...] many of the themes there would be well suited for a missions-approach. [...] the program represents the will of the people, as it were, an elected government with its associated policy goals. (Interviewee 4; Ministerial Advisor)

Opportunities in challenge-driven innovation

As was already mentioned earlier, for many respondents the major promise of challenge-driven innovation was that it offered an opportunity to fundamentally rethink how social problems were defined and who could solve them. In addition to providing novel solutions to societal problems, challenge-driven innovation could help raise awareness around a perceived problem in a more general sense, and thereby generate momentum and multiple efforts to address it, beyond a single initiative.

That is, it [an initiative] can raise an issue on the public agenda, raise awareness even more [...] then perhaps some small streams

start here and there, even if the initiative does not, so to speak, solve the social problem by itself. (Interviewee 25; Director)

An additional benefit for an organiser was that a challenge-driven innovation could help bring positive publicity in terms of innovativeness and openness to new approaches.

[...] in addition to searching for new solutions [...] the communicative aspect was very important to us. In other words, how we are perceived [...] as a pioneer in attending to the difficult problems in novel ways. (Interviewee 14; Project Director)

Particularly for practitioners working in the areas of health and welfare, challenge-driven innovation was seen as a means to strengthen the dialogue between research and practice, and to help foster experience-based problem definitions, with the aim to increase the effectiveness of interventions. In addition, a challenge-driven initiative could help empower individuals that were impacted by the challenges, although particularly when involving vulnerable population groups in a challenge-driven process, the well-being of participants constituted the first and foremost concern. Additionally, a challenge-driven innovation provided the means to create spaces for experienced professionals to rethink their practice and accustomed ways of doing things.

The idea is that we could try to combine what the research and the statistics tell us, and then what the children and young people themselves suggest. (Interviewee 17; Innovation Specialist)

[...] when young people are included, it should primarily and fundamentally be about strengthening and increasing the young person's well-being and experiences of participation and agency. (Interviewee 11; Development Manager)

From the viewpoint of businesses, the foremost promise of challenge-driven innovation was that it could help promote investment into socially and environmentally sustainable growth areas. Although a hands-on, problem-oriented way of working had always been a hallmark of successful corporations, the move towards a challenge-driven approach meant according to many practitioners a fundamental rethinking of accustomed approaches to development for businesses also. A challenge-driven approach necessitated, for example, a more complex set of calculations of value beyond conventional analyses of effectiveness and cost.

In general, a hope shared by many interviewees was that challenge-driven innovation could help reform cross-sectoral collaboration in Finland. By specifying clear challenges to be tackled, the public sector could create better

strategic focus and predictability in the Finnish business and investment landscape. In other words, many hoped that challenge-driven innovation could provide the practical means to adopt more systemic approaches to development across sectors in Finland.

Table 3 summarises the opportunities and risks/challenges with challenge-driven innovation identified by the practitioners. The list largely mirrors the international debate on challenge-driven innovation, and thereby highlights the transnational nature of policy debates. Another thing to note about it is its length. The reasons for embracing challenge-driven innovation are manifold, and much hope exists that it could help address a wide-ranging set of issues with current developmental practices across, and between, sectors, in Finland.

Despite the absence of a single shared definition, many practitioners emphasised that challenge-driven innovation, and the experimental culture that it was part of, should be understood not simply as tools, but as mindsets of development with particular aims.

Table 4: A summary of the opportunities and risks/challenges with challenge-driven innovation identified by practitioners

Opportunities	Risks/challenges
Top-down coordination	
<ul style="list-style-type: none"> • Open up both the problem formulation and solution development spaces to a wider range of stakeholders • Specify clear targets and actions required to reach them at different strategic levels • Increase policy coordination • Raise awareness and build momentum around a societal issue • Reform developmental practices across and between sectors • Identify and steer investment into sustainable growth areas • Encourage businesses to think long-term about sustainable development • Create strategic focus and stability in the Finnish business landscape • Pool resources from different funders around major problems 	<ul style="list-style-type: none"> • You choose the 'wrong' challenges • The label is embraced cynically to legitimise existing practices rather than reform them • Conceptual ambiguity & plurality leads to a variety of interpretations • The framework is dismissed as the latest trendy fad • Resource intensive, whilst the tangible impacts and benefits are unclear and hard to measure
Bottom-up implementation	
<ul style="list-style-type: none"> • Provide new actionable solutions to problems • Gather and tie scattered, already existing solutions to systemic challenges • Bring positive publicity in terms of innovativeness and openness to an organisation • Bring research and experience-based knowledge together • Empower citizens and marginalised groups to participate in defining and solving problems • Provide experienced professionals with spaces to rethink their established practice 	<ul style="list-style-type: none"> • Solutionism (promotes quick technical fixes to complex problems) • Short-termism (promotes isolated innovations that don't scale) • Leads to a confusion about the roles, responsibilities, and accountability of different actors • Promotes harmful competition and individualism • Difficult to know whether the right stakeholders have been engaged

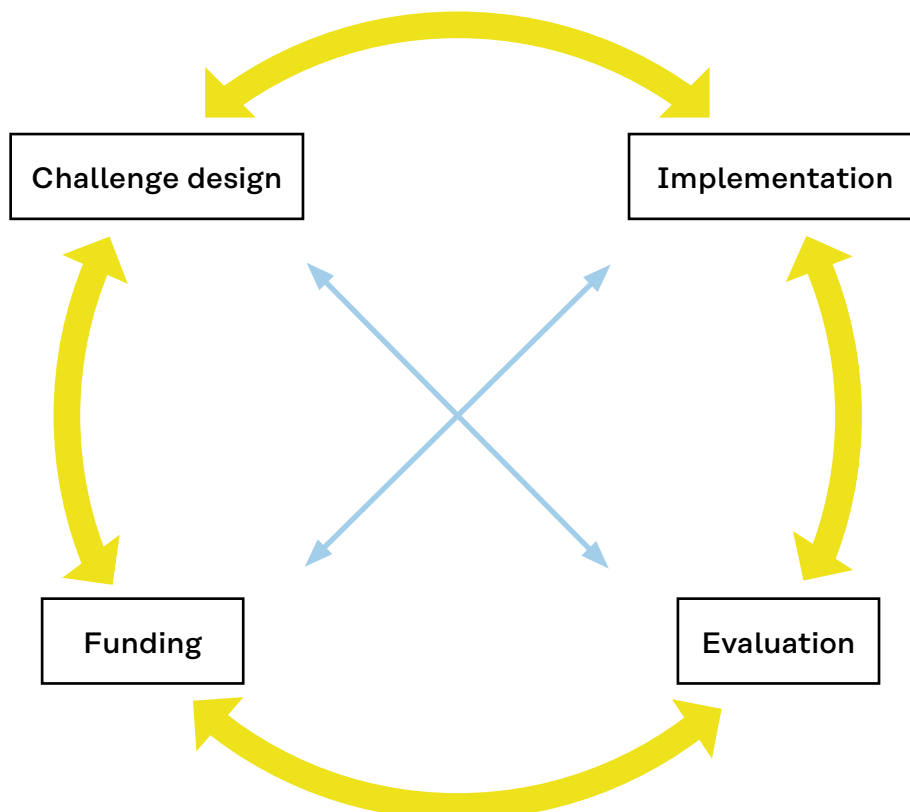
7 Designing, implementing, evaluating, and funding challenge-driven policies

Figure 2 visualises the four areas of challenge-driven policymaking under review in this report: Challenge design, implementation, evaluation, and funding. Earlier research has highlighted the need to rethink particularly these four areas in order to move from sectoral to challenge-driven policymaking (Borrás and Edler, 2020; Kattel and Mazzucato, 2018; Mayne et al., 2020).

In contrast to traditional “waterfall” models of development, challenge-driven innovation

emerges as a highly dynamic, contingent, and cyclical process. For example, the way that you set a challenge has major implications for how it will be implemented. Evaluation takes place ideally not only when the challenge has finished, but at different time periods, whereas the types of funding available often place certain boundary conditions for how a challenge can be set. We elaborate further on the complexity of each of the four areas in the sub-sections below.

Figure 2: Thematic areas of challenge-driven policymaking



7.1 Challenge design: How should a challenge be set and by whom?

The question of how issues get on public agendas is an age-old concern of political theory and practical policymaking (Kingdon, 1993). The way in which issues are defined set the stage for the types of solutions that will be sought (Peters, 2005). Who participates in the problematisation and agenda-setting processes are questions inseparable from those of power and representation in society more generally (Bachrach and Baratz, 1962). The emerging challenge-driven approach to policymaking is underpinned by the assumption that policymakers can influence the direction of growth and innovation by targeting investment and resources around clearly defined societal challenges. This proposition raises the inevitable question: Through what process should a challenge be set and by whom?

Advocates of challenge-driven innovation suggest that policymakers must facilitate challenge setting processes that employ both bottom-up (citizens, advocacy groups) and top-down (politicians, experts) perspectives, all while being aligned with key strategic priorities for sustainability, as expressed for example through the SDGs. On the other hand, the appropriate scope of a challenge seems to be a largely open question. Mazzucato (2018a, p. 11), for example, suggests that “Missions should be broad enough to engage the public and attract cross-sectoral investment; and remain focussed enough to involve industry and achieve measurable success” without, however, providing much detail on how this can be achieved in practice.

The stakes are very high. Whilst challenge-driven policies can undoubtedly boost societal support for important issues, as well as research and development more generally, they can also have the opposite effect. As Janssen et al. (2021) note, missions that are defined in a language and character far removed from the everyday concerns of citizens, may unintentionally

Example 3. Challenge-driven initiative

Sitra's Ratkaisu 100 challenge prize (open innovation)

Ratkaisu 100 (Solution 100) was a challenge prize organised by the by the Finnish Innovation Fund, Sitra, in 2017. The challenge prize progressed through three phases over a two-year period. First, members of the general public were asked what they perceived to be the most important social challenge affecting Finland. Second, Sitra launched a public call in late 2016 for teams with diverse backgrounds to participate in the competition and generate social innovations. In the last stage, 15 teams were selected for a six-month incubation period, during which they received various forms of support, such as mentoring and workshop sessions, excursions, boot-camps, opportunities to pitch and present their ideas, while competing to develop the most promising social innovation. The one-million euro prize was ultimately split between two solutions, Headai, which harnesses capabilities for identifying expertise using artificial intelligence, and Positive CV, which identifies hidden strengths in young people. Ratkaisu 100 is an example of applying challenge-driven innovation in the context of an open innovation process.

reinforce a rejection of scientific and technological responses, or heighten ideological polarisation around societal issues. At the same time, many societal problems manifest themselves largely outside of the immediate lived experience of individual citizens and require instead specialised knowledge and tools to be observable and known.

In what follows, we analyse the tensions and trade-offs involved in the challenge design process, and the ways in which practitioners go about managing them.

Study the problem and consider whether a challenge-driven approach is called for

Practitioners underscored largely unanimously the centrality of the challenge design process and emphasised the importance of investing enough time and resources into it. A desire to organise a challenge-driven initiative was by itself not a sufficient reason for doing so, but one should instead start by studying the problem and asking whether a challenge-driven approach would be suitable for tackling it. The following quote exemplifies this:

[...] so is the problem the lack of solutions or is there something else preventing us from acting differently. (Interviewee 25; Director)

Many practitioners stressed the importance of adopting a holistic, systems approach when seeking to form an understanding of the problem. The inevitable uncertainty involved in attempts to do so could be reduced by involving domain experts, such as researchers, in this early stage of the challenge design process. Across different challenge domains, practitioners suggested that one leading principle was to try to identify leverage points in the system, where an intervention would produce the largest overall impact. In addition, a central part of the challenge design process was to envision also the types of solutions that would be sought in response to the set challenge. In general, practitioners recognised both the difficulty and growing need to make bold decisions in choosing areas and problems to focus on. The following quotes illustrate this:

[...] at a general level, simply having an idea of what kinds of solutions to what types of challenges you are after [...] here's the problem, this is the angle we would like to address it from, and these are the types of solutions that could emerge. This is already a lot. (Interviewee 5; Senior Expert)

[...] then there's the major difficulty of knowing what is the core investment that

will set the entire value chain into motion. But we need to be able to recognise these and invest heavily into them. (Interviewee 23; Program Lead)

Particularly for public sector organisations, an important part of the challenge design process was to identify the correct legislative framework under which the initiative could be carried out. The Finnish procurement law, for example, set certain boundaries for the types of solutions that could be sought through a challenge-driven initiative. Such requirements needed to be taken into account when for example devising evaluation criteria. These legislative requirements had to be reconciled with the organiser's wishes for the types of solutions that would be sought through the initiative. Practitioners suggested that future organisers could explore whether other legislative frameworks, beyond procurement, might be even better suited for challenge-driven initiatives.

Another important factor to consider was whether the timing was right for the challenge. Although so called mega-trends were largely global, Finland could as a country identify specific areas, based on its technological readiness or cultural strengths, to focus on. A successful challenge design process took thus into consideration both the nature and urgency of the challenge, as well as the potential resources available to address it.

Envision the potential solvers and their motivations and capabilities

Reflecting back on their experiences of designing a challenge, many practitioners said that what they would do differently in retrospect, would be to test the formulated challenge also with the potential solvers (a term used by many practitioners to denote participants in an initiative). The way in which a challenge was formulated and communicated inevitably influenced what types of actors would be drawn to solving it. The better these actors understood the challenge, the more committed they would

be. A failure to envision and take into account the potential solvers already in the challenge design process could result in challenge formulations that promoted solutions with very limited scalability and long-term viability, as illustrated by the following quote:

If you leave out the actual adopters and implementers [...] it may be that the challenge will be formulated in such a way [...] that the resulting solutions will not be the ones that people will actually want to implement (Workshop participant)

An effective challenge design process thus involved envisioning who the potential solvers were, and what reward structures and other factors might best incentivise them to participate. Although financial rewards were undoubtedly important to many participants, other potential benefits included publicity, recognition in a professional field, and new networks. Practitioners also recognised that the appropriate incentives might vary between actors. For example, for scientists, the opportunity to participate in devising better problem definitions might be as rewarding as developing the solutions themselves. New and improved problem definitions could thus in some instances constitute a valuable outcome in and of itself for an initiative. In other cases, the main objective of a challenge-driven initiative could be to build the skills, capabilities, and agency of participants. Therefore, reflecting on and recognising what the desired outcomes of an initiative were, was an important necessary step required to design the appropriate incentives, rewards, and other competition structures.

Build legitimacy from both the bottom-up and top-down

In general, practitioners emphasised that the integrity of a challenge design process was largely an outcome of a serious consideration of who the stakeholders were that needed to be included in the process. Who were the actors

most affected by the problem? Although identifying the correct stakeholders was not easy, pre-existing research, crowd sourcing methodologies and non-governmental organisations provided useful resources to help make the task more feasible. Practitioners emphasised the centrality of local knowledge in ensuring that a sense of ownership for solving the problem would emerge. Practitioners identified the difficulty of knowing who the correct stakeholders were, and whether the right ones had been engaged, as a central difficulty in challenge-driven innovation.

Whilst noting the importance of bottom-up perspectives, practitioners also underscored the importance of building high-level political support for an initiative. Without the leadership's support, it would be difficult, or near impossible to achieve the transformation and experimentation that a challenge-driven initiative sought to achieve. The following quotes illustrate this aspect of the challenge design process:

[...] had I not had the support and the budget [...] it would have been much more difficult for me to operate within [the organisation], because it is a hierarchical one with its own way of working [...] which was easier for me to shake in a friendly way, since I had a mandate [...] (Interviewee 14; Project Director)

[...] an important enabling factor was that the director at the time supported this type of thinking [...] this meant that we did not have to follow the IOOI goal setting model as closely as usually. (Interviewee 25; Director)

Both open and focused challenges have their advantages

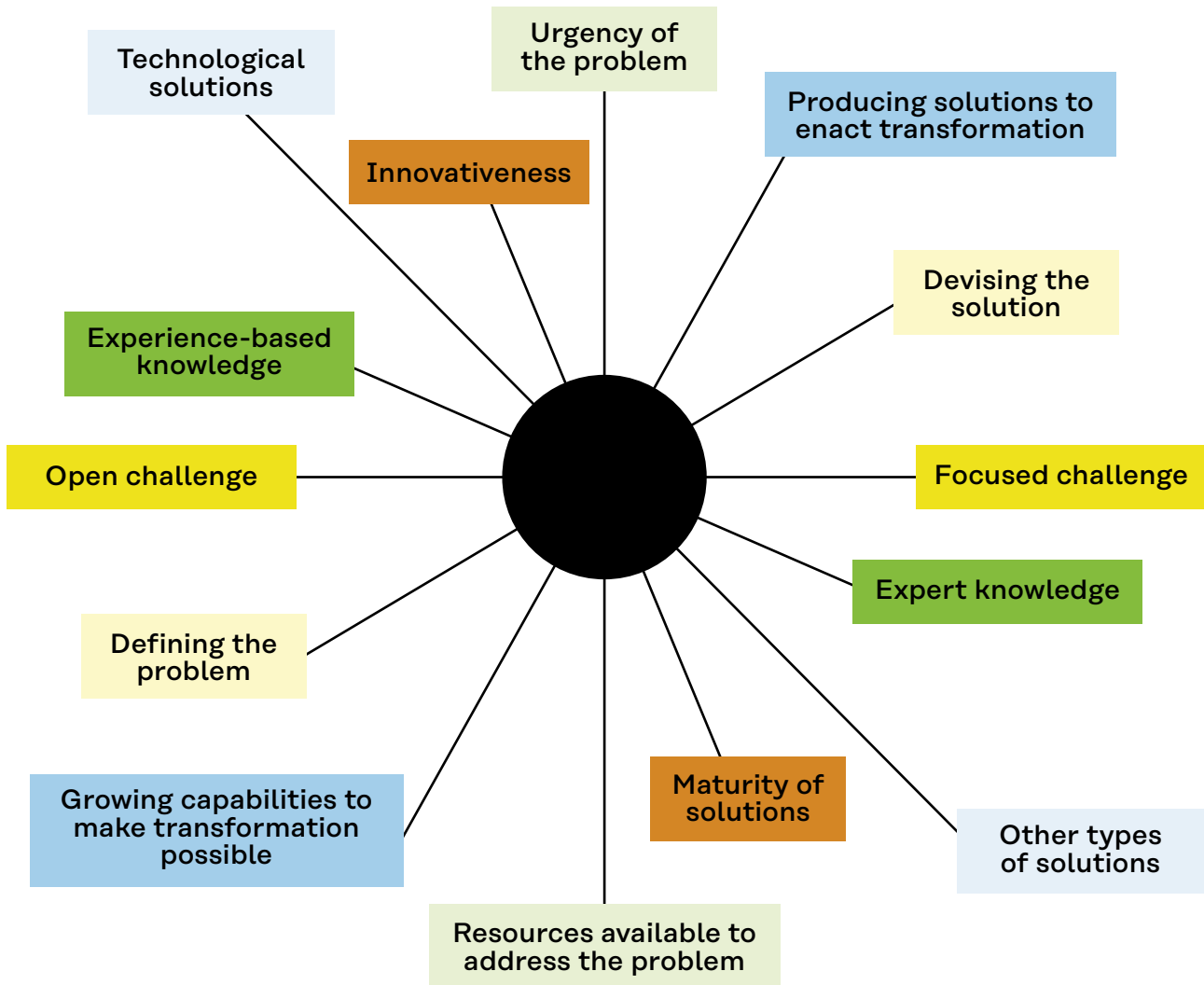
As with other aspects of the challenge design process, no single right approach existed for choosing the appropriate scope for a challenge. Both open and focused challenge definitions had their advantages and disadvantages. Whereas open challenge definitions could

attract and mobilise diverse and unusual combinations of actors to solving a challenge (with multiple complementary solutions as a result), more focused challenge definitions made it more feasible to identify the potential solvers and their needs. Many practitioners seemed to view professional diversity as an unquestionable advantage, whilst however

simultaneously questioning whether open challenge definitions always constituted the most effective approach to achieving transformative change.

Drawing on the practitioner reflections examined above, we identify at least the following central tensions and trade-offs in the challenge design process, depicted in Figure 3.

Figure 3: Tensions and trade-offs in challenge design



7.2 Implementation: How should participants in a challenge-driven initiative be supported?

The implementation of a challenge-driven initiative requires technical, managerial, and political skills to develop structures and processes that enable, incentivise, and steer actors across sectors to work towards solving a defined challenge (Mayne et al., 2020). This entails the ability to coordinate activities both within a single initiative, and between a portfolio of initiatives. Whilst innovation undoubtedly benefits from a diversity in perspectives and approaches, a central concern for organisers of challenge-driven initiatives is how to facilitate conditions, such as psychological safety and mutual learning, that foster a sense of common purpose and action across a group of individuals and teams that might work with very different sets of assumptions about the nature of social change and professional practice. In our previous research (Takala et al., 2020), we have identified this question as one of the central areas of improvement for future challenge-driven initiatives in Finland.

Consider the appropriate scale of support

Challenge-driven initiatives vary significantly depending on the types of rewards and support that organisers offer to participants. Whilst some initiatives might offer a simple financial reward for the best solution proposal, others might include extensive incubation periods where teams receive various types of support to develop their solutions.

Practitioners noted that whilst the complexity of societal challenges spoke perhaps in favour of more elaborate forms of support, incubation constituted a resource heavy process, the benefits of which were not always easy to know or assess. A primary consideration for organisers of challenge-driven initiatives was thus the amount of resources that would be invested into supporting the participants. Some

suggested that for initiatives that aimed primarily at developing better problem formulations, keeping the incubation support light could be a perfectly viable option. Others pointed out that due to the manyfold potential benefits of incubation, such as organisational learning, it could in fact constitute a relatively cost-effective mode of development. Finally, some organisers had opted to leave the choice regarding the intensity of support to the participants by allowing the winners of an initiative to choose between a one-off financial award and incubation support. The following quotes illustrate our interviewees' reflections on the appropriate scale of support:

[...] it would have been ideal to have a control group that did not participate in the incubation, to compare and see how they functioned and what kind of solutions they came up with. To see the value of incubation and whether it steered in a good or bad way. [...] Yes, there are risks involved as well as huge opportunities. The task is to a large extent about weighing the two against each other. (Interviewee 25; Director)

In financial terms, these have been worth more or less the same, so that the winning model or organisation has been able to [...] decide whether they want the research grant or whether [...] it is the service design impact accelerator they want to move forward with. (Interviewee 18; Innovation Expert)

At a general level, many practitioners argued for the need to adopt a patient, long-term view when it came to challenge-driven innovation. Always when embracing new practices and mindsets things took a while to settle and formalise. Thus, very tightly set time periods of experimentation could create temporal pressures that hindered the possibility for organisational learning that was required to apply challenge-driven innovation. Focused targets could thus in some instances be counter-productive: rather than promoting impact, they

could lead to an increased temptation to apply conventional methods and practices, simply because there was not enough time and space to adopt the new.

Offer both general and tailored support

Practitioners emphasised that participants in initiatives varied significantly in how much and what types of support they needed and would benefit from. Whereas in more narrowly defined challenges participants might consist mainly of professionals with well-established working practices, and who might thus not require as much support (albeit they might benefit from unlearning some of their established ways), open challenges invited more diverse sets of participants with more diverse needs. Many practitioners emphasised thus the need for both general support that would be offered to all participants, and more tailored support, that would be offered based on participants' needs. Basic training in certain core themes, such as experimentation, evaluation, user-centred design, and communication would benefit all participants. At the same time, however, for solutions to be viable in the long term, it was necessary that facilitators of challenge-driven initiatives offered also tailored support, which typically consisted of "opening windows" and helping participants to network with potential funders and other actors that could help with scaling up and further developing the solutions.

Such tasks placed significant new demands on innovation actors. The facilitators' resources and commitment to supporting the participants beyond the immediate period of the initiative was seen as central to ensuring the scalability and long-term impact of solutions. No simple rule of thumb existed for the appropriate period of support that should be offered to participants. Some suggested that organisers should invest double the time that they requested from the participants, as illustrated by the following quote:

Example 4. Challenge-driven initiative

Klash challenge prize (public procurement)

Klash was a challenge prize organised by the Association of Finnish Municipalities (fin Kuntaliitto) in co-operation with FCG Finnish Consulting Group, KEVA, KL-Kuntahankinnat, KL-Kustannus and Kuntarahoitus. The competition focused on three real-life challenges facing Finnish municipalities: 1) a mobility service for sparsely populated areas 2) a platform for voluntary activities by local residents 3) a solution to support young people to commit to their studies (to stay on the study path).

The competition progressed through two phases. In the first phase, the challenges were opened to the general public for teams to participate (e.g., start-ups, associations and students) in solving the challenges that the municipalities face. Several teams were chosen for each challenge, and were given a chance to develop their ideas further with support from innovation professionals. The winners were announced in January 2020 and those teams were invited to procurement negotiations with the Association of Finnish Municipalities. This challenge competition is part of the Association of Finnish Municipalities STI investments, who have provided long-term support to the winning teams. Eventually, the winning solutions are piloted, and the objective is to implement the solutions in several Finnish municipalities. Klash is an example of applying challenge-driven innovation in the context of public procurement.

[...] so if you demand from the team that they spend half a year on this, then you should be almost willing as a facilitator to invest another half a year to walking beside them. (Interviewee 2; Leading Specialist)

Clarify roles, rules, and expectations

In general, practitioners emphasised the importance of clearly communicating the roles, rules, and expectations of the different stakeholders in an initiative. Due to the novelty of the challenge-driven approach, and the fact that one of its central aims was to bring different stakeholders together to solve challenges, roles and expectations could easily become confused. Challenge-driven innovation meant that organisers had to take on a new role, one that was not necessarily yet very clearly defined. A Leading Specialist for example explained that:

[...] what I have personally found difficult is precisely this, that at what point, how much or how little should you get involved. [...] if I would organise something like this again, I would focus more on clarifying the different roles of everyone involved. (Interviewee 21; Leading Specialist)

In general, practitioners identified the potential confusion about the roles, responsibilities, and accountability of different actors as one of the central risks with a challenge-driven approach.

[...] then the roles and responsibilities can get confused, so what is the accountability in the end, if you, as a funder start saying that [...] the funding is for a specific type of activity. [...] it should be the implementer [...] who bears the responsibility for the project's success. (Interviewee 15; Director)

A clear communication of roles, rules, and expectations was seen also as the precondition for nurturing an environment of trust, collaboration, and the sharing of ideas, as illustrated by the following quote:

So it was really important that everyone commits to [...] that here we can talk about business secrets, that you yourself choose what you tell and how much and if you tell something, then it stays inside the workshop. (Interviewee 18; Innovation Expert)

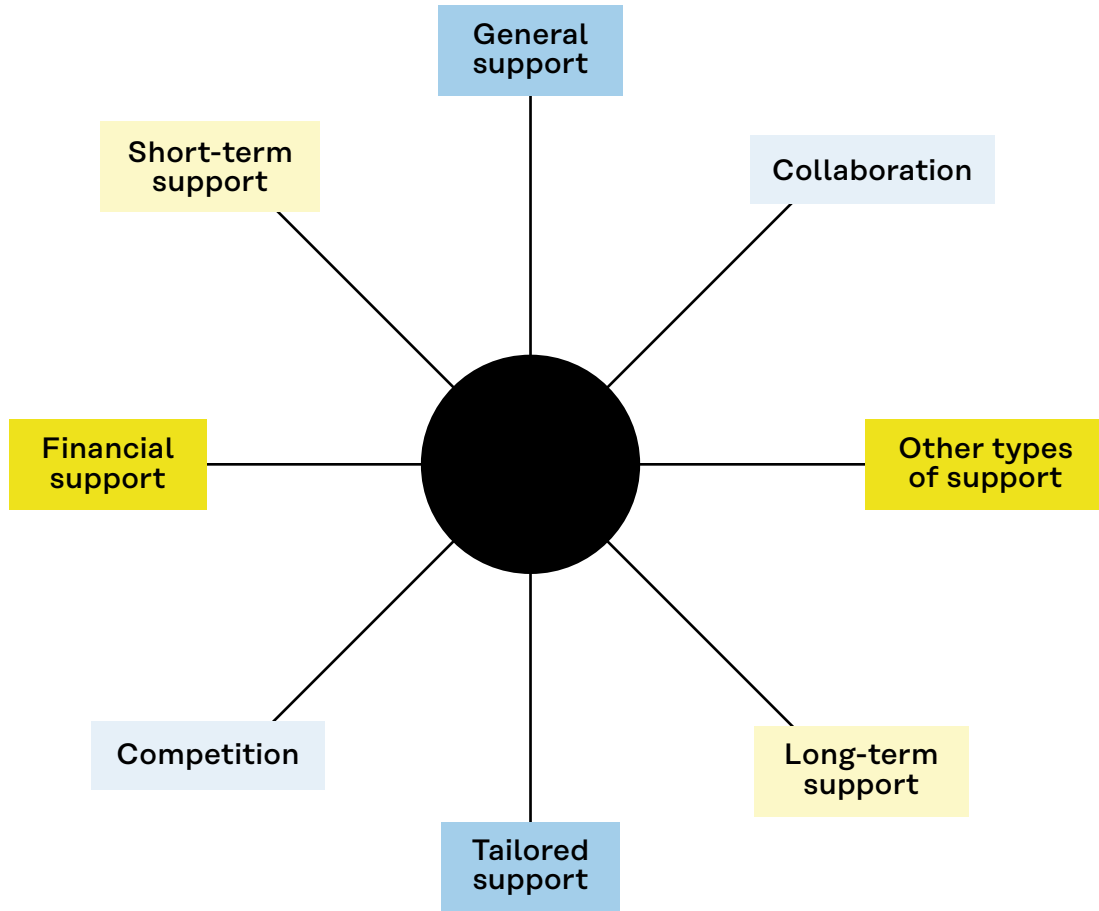
Converge participation and regular work, offer bootcamps, and make sure to have fun too

Practitioners emphasised that one way to increase the commitment of participants was to try to align the work expected in the initiative and the participants' regular work. At the same time, regular excursions for a set period of time, perhaps also involving travel to a new destination, was an effective means to help ensure participation and commitment. Focused work periods for one or two days often helped to leapfrog the developmental process forward. Other practitioners underscored that amidst all the hard work and serious topics, it was important to include also fun and light activities in the process. One way to boost positive spirits was to allow spaces for participants to envision the things that they would be proud of at the end of the initiative, regardless of whether they had been selected as winners or not. Such considerations were of particular importance when involving vulnerable populations in a challenge-driven process, as explained by a Development Manager:

So that in the future, no young person [...] should feel that they have somehow failed. If you have challenges in your life, and you don't have the energy, then that's totally fine with us [...] that success in the final score does not determine anyone's worth. (Interviewee 11; Development Manager)

Drawing on the practitioner reflections above, we identify at least the following tensions and trade-offs in challenge implementation, visualised in Figure 4.

Figure 4: Tensions and trade-offs in challenge implementation



7.3 Evaluation: How should the success of a challenge-driven initiative be evaluated?

The open-ended, non-linear nature of transformative innovation puts under scrutiny traditional assumptions about policy evaluation. Whereas many pre-existing evaluation frameworks focus almost exclusively on measures of efficiency and cost, a challenge-driven approach necessitates dynamic indicators able to account for new opportunities created (proactive market shaping and co-creating), as well as collective learning from policies (Kattel et al., 2018). No simple straightforward measure exists, for example, for the long-term transformative impact of a challenge prize (Toivonen et al., 2021). Organisers of challenge-driven initiatives thus need to explore novel approaches to measurement (such as user research, big data, experimental testing, and horizon scanning), whilst simultaneously ensuring accountability, transparency and commensurability of the choices made (arguably a strength of conventional evaluation frameworks).

From evaluating costs and benefits to capturing learning and culture change

Practitioners identified evaluation as a demanding area of challenge-driven innovation urgently in need of development. Although the theoretical writings on challenge-driven innovation underscored clear, measurable, and time-bound targets (Mazzucato, 2018b), social challenges could rarely be easily translated into such. Cost-benefit types of evaluation frameworks still dominated the thinking around evaluation particularly within government in Finland, and this was not an easy thing to change. Systemic approaches that measured success not in terms of the success of single initiatives or policies, but rather in whether the actual problem had been addressed, were still rare or altogether missing in Finnish policy-making. Practitioners questioned the extent to

which the deeply ingrained focus on cost-effectiveness was compatible with challenge-driven innovation. The following quotes illustrate this:

The central difficulty with evaluation is that it is being done afterwards, and what is being measured is the success of the project, and not, for example, the improvement in the child's wellbeing. (Interviewee 18; Innovation Specialist)

[...] there exists much pressure to adopt cost-benefit type of thinking. You want to get a return for your euros, and you want the effectiveness to be proven with numbers [...] I think it's difficult, because at the same time you are very much at the beginning of the innovation process, which means that any results will be intermediate results only. (Interviewee 16; Program Manager)

Practitioners emphasised that a central aspect of the change needed was to move from traditional input output evaluation frameworks to assessing the learning and changes in mindsets and cultures that had resulted from initiatives. This was far from an easy task, as the following quote illustrates:

Evaluation is by far the trickiest part [...] Since we do not know what works, we need to aim into the fog. How do you word the aim so that includes learning and not just the output [...] (Interviewee 3; Development Specialist)

Although the practitioners in our sample had applied mainly conventional evaluation methods, such as follow-up surveys and interviews with participants, the vast majority recognised a growing need for methodological inventiveness and experimentation. Practitioners underscored particularly the need to develop dynamic indicators of impact that can be clearly communicated to external stakeholders. For some practitioners, developing

Example 5. Challenge-driven initiative

The Finnish Climate Fund (public investment bank)

The Finnish Climate Fund is a fully state-owned company established in 2020. The fund has three focus areas: climate change mitigation, low-carbon industry, and digitalisation that promote emissions reduction (for example, through efficiency improvements and upcycling of materials). Approximately 35 % of the funding is dedicated to the digitalisation theme. The Climate Fund seeks to add value by enabling earlier, and wider scope investments in the abovementioned areas. The company can take on more higher risk projects than private funders and seek to maximise societal impact (in addition to carefully evaluating each investment project's economic viability). Furthermore, the Climate Fund applies an impact investing strategy and carefully evaluates the emission reduction potential of each project. The Finnish Climate Fund is an example of providing targeted challenge-driven funding to specific focus areas to accelerate, and scale up, ideas and early businesses.

new measurement frameworks had been the single most valuable outcome of their initiative.

[...] perhaps the most valuable part of all was that we were able to develop an evaluation model for experiments [...] centring very much around the idea that it is not a conventional critical evaluation from the outside, but that learning, and capturing the learning is a prerequisite for success. (Interviewee 20; Leading Specialist)

Evaluation criteria for challenge-driven initiatives

Many practitioners elaborated on the nature of the novel evaluation criteria they had developed for their challenge-driven initiatives. A Development Specialist explained that the key objectives for them had been to influence culture, the way of working within organisations, to promote a feeling of inclusion, and to speed up learning processes. Similarly, another interviewee commented that they currently measured competence development as well as changes in ways of thinking among participants.

Particularly in the context of a climate related initiatives, practitioners underscored the importance of clear measurable outcomes related to the challenge. A Director explained that whilst learning and culture change constituted desirable aims, the main focus of evaluation should be on clear quantifiable targets related to climate change:

[...] so in a straightforward manner that it's about reducing the amount of plastic waste or CO2 emissions, even if you then have all those other good goals alongside [...] (Interviewee 26; Director)

In general, practitioners emphasised that irrespective of whether an initiative had led to implementable outcomes or not, it was crucially important to capture and document the learnings gained, so that future initiatives might continue innovating onward from where the previous ones had ended.

Evaluate during and after an initiative, as well as in the long-term

Practitioners underscored largely unanimously the importance of investing sufficient resources into evaluation when adopting a challenge-driven approach. As for the appropriate timing of the evaluation, particularly three time periods came up. Firstly, running a challenge-driven initiative was a laborious task that

tended to capture the full attention and energy of the organising team. Practitioners suggested thus that resources should be invested into assessing the effectiveness of the support offered already during an initiative. An outsider view could help to capture the learnings, as well aspects of the support offered that were working and those that were not.

I at least dived pretty fully into the process [...] which tends to make you blind to certain things [...] hence it might be helpful to have an outsider view. (Interviewee 11; Development Manager)

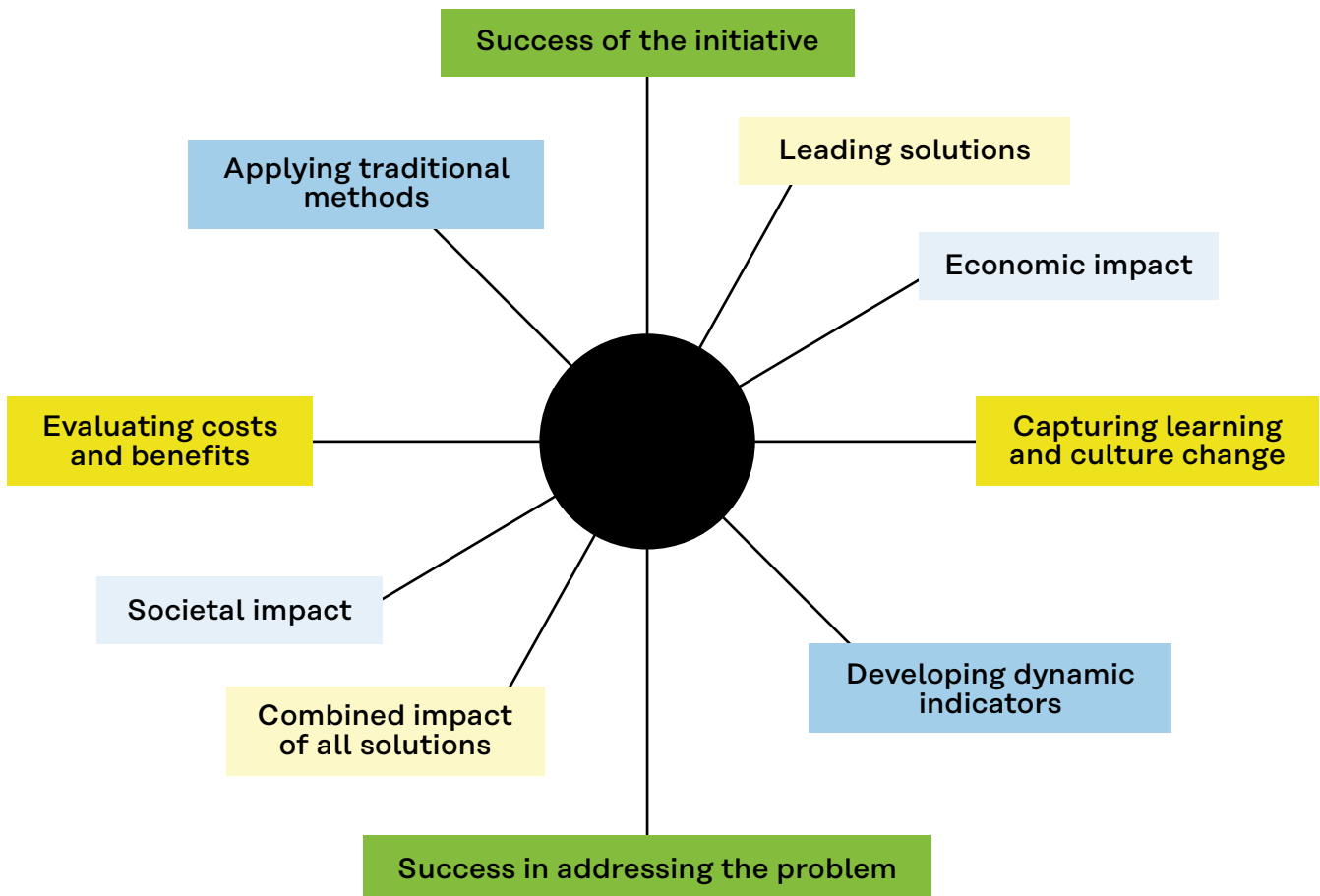
A second suggested time for evaluation was the immediate aftermath of the initiative. At this point, central things to measure could be for example the amount of external funding that participants had managed to obtain during

the initiative. Finally, in the longer term, the broader transformative impact of an initiative needed to be assessed. The potentially long time span of when transformative impact could realistically be measured was identified by the interviewees as another central difficulty in challenge-driven innovation. A Programme Lead described this in relation to climate change:

The time span creates its own difficulties. One clear theme that we want to address is the carbon footprint. But measuring impact is by no means easy. (Interviewee 23; Program Lead)

Drawing on the practitioner reflections above, we identify at least the following central tensions and trade-offs in challenge evaluation, visualised in Figure 5.

Figure 5: Tensions and trade-offs in challenge evaluation



7.4 How should challenge-driven initiatives be funded and by whom?

Public organisations need a clearer view of where along the innovation chain their investment yields the most impact. Public funding is important to encourage private actors to take on longer-term and riskier projects, which is a requirement for transformative innovation (Mazzucato and Macfarlane, 2017). By funding, we refer to both general funding structures in Finland, as well as to those of single challenge-driven initiatives. The type of funding available in many ways pre-conditions the aims of a challenge-driven initiative, as organisers of initiatives must take into consideration potential boundary conditions associated with different types of funding. Within our sample, funding for challenge-driven initiatives had been provided through at least four different sources: 1) National and EU level funding instruments channelled through an intermediary 2) third sector funding organisations acting as sponsors 3) public procurement instrument when the organiser is a public actor and 4) private actors purchasing the innovation service from consultants.

What types of funding structures and mechanisms might best incentivise and support promising projects to see through their socially transformative ideas?

From resource heavy processes to dynamic and fast paced funding

Practitioners identified resource intensity as perhaps the single biggest issue with current funding structures in Finland. For example, promising ideas and concepts born in a challenge prize too often did not develop further simply due to the significant resources currently required to build a competitive funding application. This was seen as a problem for both small start-ups and large businesses, as the following quotes illustrate:

[...] challenge prizes often lead to very promising ideas. But when you then start turning the idea into a project afterwards, you realise that simply applying for further financing requires a lot of resources. This is not the most agile way to implement ideas. (Interviewee 17; Innovation Specialist)

[...] an awful lot of applications go in and come out as rejections by these industrial and technology companies. And it's extremely frustrating to keep working on the same application [...] Within the current structure, the only way to resolve this would be to increase the availability of agile, more easily attainable funding. (Interviewee 13; Managing Partner)

Innovation vouchers that were currently being offered mainly to small and medium sized businesses were mentioned as an example of a low-threshold funding instrument that could be made available more widely. Furthermore, some Finnish foundations were experimenting with funding models where a decision could be reached based on only a small number of evaluation criteria in just a few days.

Practitioners identified the tendency for each funder to have their own instruments and initiatives as another issue in need of addressing. Practitioners hoped that challenge-driven innovation could help pool resources from different funders around shared challenges, as illustrated by the following quote:

[...] in terms of financing, we should go more in a direction where [...] we do things together instead of everyone having their own instrument and their own calls for applications for it. (Interviewee 15; Director)

Bridge-funding for the scaling up of ideas

In addition to resource intensity of the application processes, another prominent issue was the availability of longer-term, “patient” funding needed to scale up ideas. Typically support

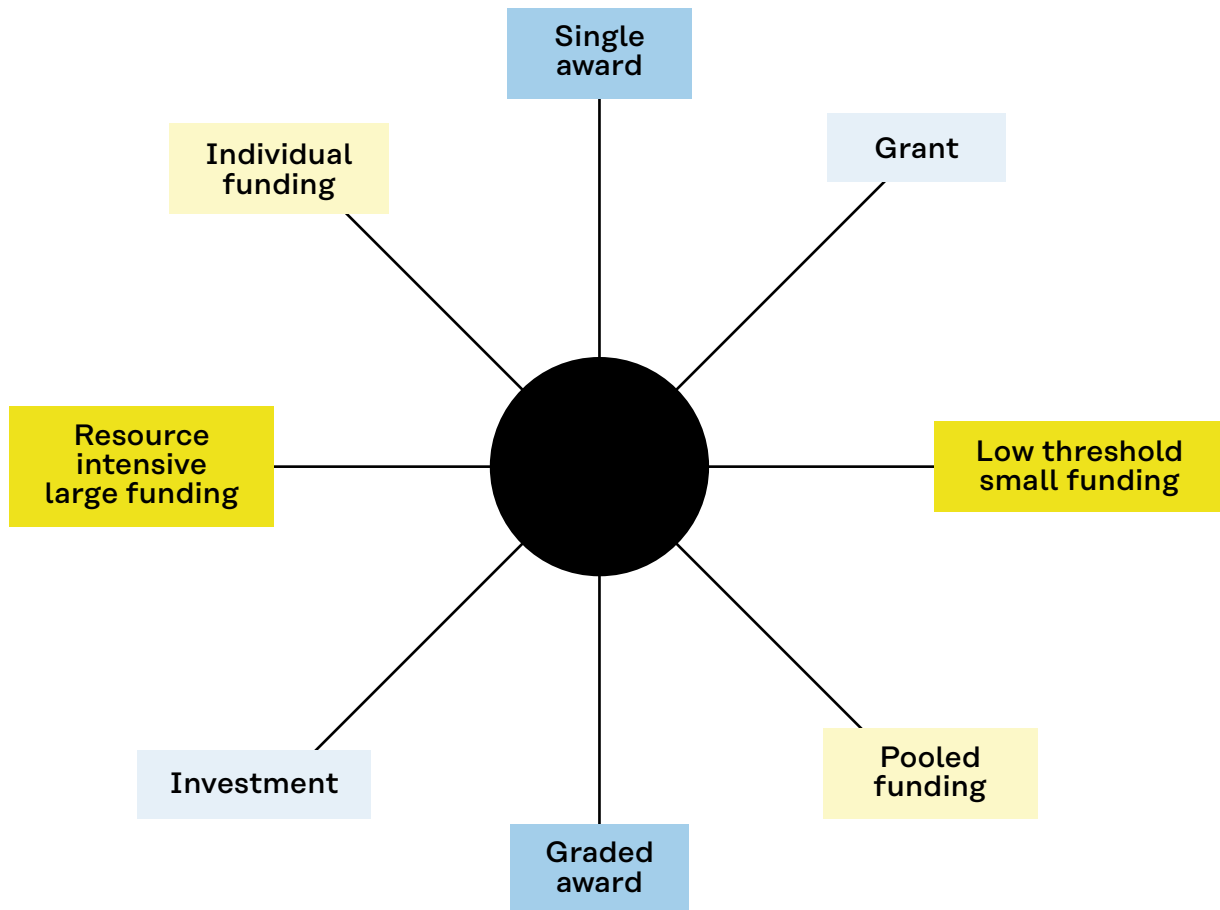
(such as networks, knowledge, and a smaller sums of money) was offered during an initiative, with a one-off prize at the end. This general model tended to leave the post-competition stage largely open. Practitioners highlighted that much space for experimentation currently existed in relation to both broader funding structures as well as those of single initiatives, such as challenge prizes. For example, instead of allocating the majority of funds to one winner, a larger overall impact could potentially be achieved by distributing funds more widely, through milestone payments made over a longer period of time, even beyond the incubation phase. Financial support could in the future also be combined more effectively with other types of support based on need. Practitioners recognised that more elaborate funding structures would require new

skills and mindsets from the organisations providing the funding. One Innovation Specialist reflected on the difficulty of arguing for more complex prize structures in contexts where challenge-driven innovation itself was very new:

[...] the problem comes with the commitment required, with the ability of the organisation [...] for whom acceleration itself might be new, that if you add more layers to the funding the process becomes even more complex. (Interviewee 2; Leading specialist)

Drawing on the practitioner reflections above, we identify at least the following tensions and trade-offs in challenge funding, visualised in Figure 6.

Figure 6: Tensions and trade-offs in challenge funding



Part 3: Where next?

We conclude the report by examining what structures and capacities are currently missing in the Finnish innovation ecosystem in order to reap the full benefits of challenge-driven innovation going forward.

8 Continuity, and current barriers to transformative change

Challenge-driven innovation has been criticised for being overly focused on promoting new innovations rather than investing in their diffusion and uptake (Boon and Edler, 2018; Toivonen et al., 2021). At the same time, it is increasingly recognised that the lack of technological and scientific solutions is usually not the bottleneck in need of solving, rather, it is the diffusion of innovations and the coordination it requires.

Our interviewees recognised the difficulty with diffusion and scaling as perhaps the most significant current obstacle to transformative change in Finland. Challenge-driven initiatives created at best an enormous amount of innovation, passion, and novel practice, yet capturing and institutionalising them remained a major difficulty, partly due to the significant amount of organisational inertia that existed, especially in the public sector. Many practitioners said that at the moment, anyone adopting a challenge-driven approach would quickly face the difficulty that at the level of everyday practice, the public sector was still largely organised into competing and disconnected silos.

Practitioners explained that because challenge-driven initiatives often sought to introduce and develop new practices, they remained by necessity disconnected from current societal and organisational structures. A key requirement for the future was thus to have societal actors with sufficient knowledge and resources to help tie innovations and novel practices (resulting from challenge-driven initiatives) to existing structures and institutions. Many practitioners called out for dedicated ecosystem orchestrators whose job it would be to support, link, and manage ecosystem actors towards solving a shared challenge (see for example van Vulpen et al., 2022). Such actors would need to have the required resources to build links

between actors, open doors, and provide targeted support based on need even during longer time periods. Ideally, such orchestrators would be neutrals who would offer support irrespective of who had originally provided the funding for the innovation or team. Some practitioners felt that this function should be provided through public means, whereas others saw it as one better filled by private actors. Due to the lack of systemic public support for ecosystem orchestration in Finland, this role was currently being filled by private companies. The following quotes illustrate the perceived urgent need for dedicated ecosystem orchestrators:

[...] a more difficult issue to solve, such as with these climate solutions [...] is that they are not the application of one facility or one technology, hence what is needed is a reliable, neutral and active actor who takes you, leads the change forward with everyone involved. (Interviewee 14; Project Director)

[...] [another obstacle is] the lack of ecosystem facilitators who invest time, effort and expertise. Precisely the issue that you can't find actors that have the resources [...] to build bridges, open windows, to practice the targeted funding that is needed. (Interviewee 2; Leading Specialist)

Finally, practitioners explained that in the end, change came down to new mindsets, capabilities, and a willingness to learn. Many felt that Finnish society overall would benefit from a more entrepreneurial mindset. Organisational and cross-sectoral silos could be reduced by developing and fostering a better conversational culture. Organisations, from political parties to government departments

and companies needed to become better at adopting and cultivating further already existing good ideas, irrespective of who had introduced them, instead of always starting new initiatives from scratch. Establishing a new cross-sectoral “Ministry of Big Issues” was suggested as one potential way to foster

experimental and challenge-driven approaches in central government. Albeit many obstacles to transformative change were identified by the practitioners, overall, they remained optimistic about the prospects for positive change in Finland in the not-too distant future.

...it is increasingly recognised that the lack of technological and scientific solutions is usually not the bottle neck in need of solving, rather, it is the diffusion of innovations and the coordination it requires.

9 Conclusion: Critical questions for future research and practice

In this report, we have sought to contribute to the ongoing discussion about challenge-driven innovation by scrutinising the practices that underpin the emerging policymaking framework. By examining practitioner experiences of the practical implementation of challenge-driven innovation, we have identified central tensions and trade-offs that organisers of initiatives are confronted with and have to negotiate when designing, implementing, evaluating and funding challenge-driven initiatives. We do not believe that there exists one correct way to go about this task, instead, we encourage policy-makers to discuss and make explicit the ways that they manage the potential trade-offs. Challenge-driven innovation is a value-laden process that involves series of choices that influence the types of transformative actions that are set into motion and supported by challenge-driven initiatives (Takala et al., 2020). Transparency of decision making is one way to promote accountability to citizens and other stakeholders when setting directions for transformative action.

At a more general level, our analysis points towards a need for a more refined discussion about our assumptions regarding transformative change. What types of activities and innovations should be promoted and rewarded through challenge-driven innovation in order to enact genuine change? Here again we face a potential trade-off between promoting innovations which, albeit fitting well into the framework of the current economic order (and thus satisfying more easily conventional criteria for impact), might ultimately be less effective in tackling the deeper structural issues that lie at the root of societal problems. Could and should we envision more radical approaches and experiments?

We conclude this report by raising four critical questions for future research and practice on challenge-driven innovation based on our analysis.

- 1) What tensions and trade-offs exist at different levels of policy-making? How relevant are our findings regarding the tensions and trade-offs in challenge design, implementation, evaluation and funding, when for example setting national challenges/missions?
- 2) Who will take up the role of systemic ecosystem orchestration in Finland? Are entirely new actors (e.g. public sector ecosystem orchestrators) required or do established innovation actors need to take on new roles, functions, and responsibilities?
- 3) How do we minimise the risk of challenge-driven innovation resulting primarily in innovations that do not scale? What types of concrete policy instruments could best support longer term novel ecosystem development for transformative change?
- 4) How can funding agencies collaborate more effectively to resource challenge-driven innovation in ways that promote transformative impact?

These are some of the central questions that our Business Finland funded (2021 – 2024) research project “Towards an Entrepreneurial Welfare State? The Practices of Challenge-Driven Innovation Policies” based at Hanken School of Economics will seek to address through specific case-studies of leading challenge-driven initiatives in Finland.

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