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TOWARDS SOLVING WICKED PROBLEMS – BROAD UNDERSTANDING OF THE PROBLEM AND SHARED DIRECTION IN MULTIDISCIPLINARY TEAMS

Case Sitra Lab

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Towards solving wicked problems – broad understanding of the problem and shared direction in multidisciplinary teams
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SITRA STUDIES IS a publication series which focuses on the conclusions and outcomes of Sitra's future-oriented work.

Contents

Foreword

On a Thursday in March 2020, Sanna Marin's Government held a briefing that resulted in the lock-down of all of Finland. Like so many others, also the Sitra Lab boat overturned.

Traditionally, Sitra Lab's "business" has been to bring people together to learn from each other and grasp societal problems. We design programmes whose cornerstones have been contact days, visits, workshops, practical experiments, surprise conversations at the coffee thermos and face-to-face encounters with diverse people.

With hindsight, we have been able to even take pride in looking at how many parties migrated their work online as of March and were able to develop completely new ways of working. At Sitra Lab, we now have practical experience in how rapid organisation in an exceptional situation is possible and we can set off to tackle diverse problems despite the changes.

On the other hand, the pandemic has left new problems in its wake, and the existing ones seem even more wicked than before at times.

In a way, we know the medication to the problems: we know that we need co-operation across organisational boundaries, new ways to grasp problems and changemakers that act. Nevertheless, societal problems are complicated, and the solutions often involve differences of opinion. At the same time with the need for versatile expertise, we would also need to find a common direction.

It will be interesting to find out what will concretely happen when multidisciplinary teams approach wicked problems and create a shared understanding of the identified problem and possible solutions.

The report you are reading provides concrete answers to how overwhelming societal problems should be grasped, how to take care of learning from experiments, which structures the teams need to support them and what is the meaning of an individual's experience in supporting this changemakership.

The study will follow the journey of four teams throughout Sitra Lab and pays particular attention to the practices and interaction of the teams. The point of view is valuable because change is often emphasised when talking about change-making. We talk in detail about what we are changing and what kind of a change we want to see. Yet, we should not forget that "making" is the latter part of this compound word.

By looking at the practices and interaction of changemakers, we can find keys to the solutions to societal problems. These keys also work on Teams – regardless of the industry and sector.

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Summary

This report focuses on the work of multidisciplinary teams with wicked problems. It is based on the analysis of extensive empirical observation and interview data, and describes the activities of four teams in the Sitra Lab training programme during 2020, the year of the COVID-19 pandemic. The training programme focused on finding solutions from nature to the problems of urbanisation. The pandemic situation made it necessary that the participants adapt to the use of new kinds of tools for remote work to create a shared understanding of the complex problems and their potential solutions.

We selected four teams for close analysis and observed their work on a weekly basis for seven months. Our observations followed the whole arc of their work, starting from better understanding the problem and proceeding from framing it to experimenting with the solution. The interaction and practices of the team and how these influenced the team's collaboration and creative problem-solving were the main questions of our observation. Creating a broad understanding of the identified problem, framing the problem, identifying opportunities for experimenting and finding a shared direction emerged as the key themes of the study.

We are hoping that the study will benefit diverse multidisciplinary collaboration programmes, as well as all organisations that deal with wicked problems. We hope that it will encourage them to develop ways of supporting creative problem-solving and multidisciplinary teamwork.

Creating a broad understanding of the identified problem

The Sitra Lab training programme created a (creative problem-solving) process in which the aim was to understand the problems and solutions broadly before more precise framing. From the point of view of many participants, this differed significantly from their customary way of working – and required them to be patient and re-orientate their attitudes. The complexity of the problem, freedom in framing the problem and identifying the potential solutions required the participants to seek new approaches and tolerate uncertainty.

Efficient work required the teams to keep their mindsets open with regard to both a more comprehensive understanding of the problem and alternative solutions. For some of the teams, this gave rise to frustration. Some teams were more impatient with outlining and framing the problem, and they wanted to reach the concrete problem-solving tasks faster. They would have been willing to frame the problem or solution already at an earlier stage. However, the process of the Sitra Lab training programme forced the teams to have patience and avoid prematurely locking the problem and its solution into a single, fixed frame. In practice, it meant that the training programme offered the teams the points of view of different experts (which in part forced the teams to update their understanding and views) and diverse methods that helped to think about the problems and solutions more extensively than they were used to. The new way of thinking and holistic approach to problems were considered a valuable lesson learned during the training programme, and something that the participants also wanted to use in future projects.

Framing the problem and identifying opportunities for experimenting

The extent and complexity of the wicked problems made it difficult to formulate a concrete solution. Many of the Sitra Lab teams experienced challenges in perceiving and framing the experiment conducted during the training programme concerning a multi-faceted problem.

All the participants felt that the problem their team had chosen to work on was important and worth the effort. However, some of the teams had difficulties in perceiving the significance of their work in Sitra Lab from the perspective of the big picture. The lack of a shared perception made some of the teams suspect how their solutions could promote the desired change. On the other hand, framing the problem and thereby identifying the opportunities for experiments became difficult with no shared perception.

For the progress of their problem-solving efforts, it is indeed important that teams can contextualize their work in the broader problem and societal needs surrounding it. In Sitra Lab, this required the teams to regularly discuss the theme and around it, and the collaboration with external experts was of great assistance to the discussions.

Finding a shared direction

Responding to wicked problems calls for the collaborative crafting of an understanding of complex and ambiguous problems that have no single correct answers. Progress from framing the problem towards finding a working resolution required the team to create a shared understanding, to meet each other halfway and compromise. For the team to proceed with the concrete outcome in the required time, at times, this means letting go of one's own idea and point of view. It is important that the team finds and commits to a shared direction in order to proceed with problem solving. The will to understand the thoughts of others who often think in different ways and the ability to link one's own perceptions with others' opinions are important central tools in creating this shared understanding.

Even though a multidisciplinary team and access to a variety of views are, as a rule, important resources in effective responses to wicked problems, having experts from multiple fields involved in the team does not guarantee that responses incorporate different points of view or construct a broader vision of the topic. Teams also need the ability and will to use the diverse expertise their members have. Expertise is not only about in-depth knowledge, but also a way and capability of discussing with other experts. Welcoming and constructive discussions are the best way to use the extensive insights of a multidisciplinary team.

Tiivistelmä

Tämä selvitys syventyy monialaisten tiimien työskentelyyn viheliäisten ongelmien parissa. Selvitys perustuu laajaan empiiriseen havainnointi- ja haastatteluaineistoon sekä kuvaa neljän tiimin toimintaa koronapandemiavuoden 2020 Sitra Lab -koulutusohjelmassa.

Koulutusohjelmassa keskityttiin etsimään luontopohjaisia ratkaisuja kaupungistumisen haasteisiin. Pandemiatilanteen vuoksi oli välttämätöntä, että osallistujat sopeutuivat uudenlaisiin työvälineisiin ja heillä oli kykyä luoda yhteistä ymmärrystä etäyhteyksin työstettävistä monimutkaisista ongelmista ja niiden mahdollisista ratkaisuista.

Seurasimme valittua neljää tiimiä viikoittain, seitsemän kuukauden ajan, alkaen ongelman paremmasta ymmärryksestä ja edeten sen rajaamisesta ratkaisun kokeiluun. Tiimin vuorovaikutus ja käytännöt sekä se, miten nämä vaikuttivat tiimin yhteistyöhön ja luovaan ongelmanratkaisuun olivat havainnointimme pääkysymyksiä. Selvityksen tärkeimmiksi teemoiksi nousivat ongelman monipuolinen ymmärrys, ongelman rajaaminen ja kokeilumahdollisuuksien tunnistaminen sekä yhteisen suunnan löytäminen.

Toivomme, että selvitys hyödyttää paitsi erilaisia monitieteellisiä yhteistyöohjelmia myös kaikkia viheliäisten ongelmien parissa työskenteleviä organisaatioita. Toivomme sen kannustavan heitä kehittämään tapoja tukea luovaa ongelmanratkaisua sekä moninäkökulmaista tiimityötä.

Ongelman monipuolinen ymmärtäminen

Sitra Lab -koulutusohjelma muodostaa (luovan ongelmanratkaisun) prosessin, jossa ongelmia ja ratkaisuja pyritään ymmärtämään monipuolisesti ennen tarkempaa rajausta. Monen osallistujan kannalta tämä erosi merkittävästi totutusta toimintatavasta – ja vaati heiltä kärsivällisyyttä ja uudelleen asennoitumista. Ongelman avoimuus, vapaus ongelman rajaamisessa sekä mahdollisten ratkaisujen tunnistamisessa vaati osallistujilta sitä, että he etsivät uusia lähestymistapoja ja sietävät epävarmuutta.

Tehokas työskentely edellyttikin, että tiimit pitivät ajattelunsa avoinna niin ongelman laajemman ymmärryksen kuin vaihtoehtoisten ratkaisujen suhteen. Tämä sai aikaan joissain tiimeissä turhautumista. Osa tiimeistä oli kärsimättömämpiä ongelma hahmottamisen ja rajaamisen kanssa. He halusivat päästä nopeammin konkreettiseen tekemiseen. He olisivat olleet halukkaampia rajaamaan ongelmaa tai ratkaisua jo aikaisemmassa vaiheessa. Sitra Lab -koulutusohjelman prosessi pakotti kuitenkin tiimit malttamaan ongelman ja sen ratkaisun ennenaikaisen rajaamisen kanssa. Käytännössä se tarkoitti sitä, että koulutusohjelmassa tarjottiin tiimeille eri asiantuntijoiden näkemyksiä (mikä osaltaan pakotti tiimit päivittämään ymmärrystään ja näkemyksiään) sekä erilaisia menetelmiä, jotka auttoivat ajattelemaan ongelmia ja ratkaisuja totuttua laajemmin. Uudenlainen ajattelutapa ja kokonaisvaltainen ongelmien lähestyminen koettiin koulutusohjelman arvokkaaksi opiksi ja asiaksi, jota osallistujat halusivat hyödyntää myös tulevissa projekteissa.

Ongelman rajaaminen ja kokeilumahdollisuuksien tunnistaminen

Viheliäisten ongelmien laajuus ja monimutkaisuus tekivät konkreettisen ratkaisun muodostamisen vaikeaksi. Monella Sitra Labin tiimeistä oli haasteita hahmottaa ja rajata koulutusohjelman aikana tehtävää kokeilua monitahoisesta ongelmasta.

Kaikki osallistujista kokivat, että tiimin työnsä kohteeksi valitsema ongelma oli tärkeä ja vaivannäön arvoinen. Osa tiimeistä ei kuitenkaan osannut hahmottaa Sitra Labissä tehtävän työn merkitystä laajemman kokonaisuuden kannalta. Yhteisen näkemyksen puute sai osan tiimeistä epäilemään, miten heidän ratkaisunsa voisi edistää toivottua muutosta. Toisaalta myös ongelman rajaaminen ja sitä kautta kokeilujen mahdollisuuksien tunnistaminen kävivät hankaliksi yhteisen näkemyksen puuttuessa.

Onkin myös käytännön työn etenemisen kannalta tärkeää, että tiimi pystyy liittämään työnsä sitä ympäröivään laajempaan ongelmaan ja yhteiskunnan tarpeisiin. Sitra Labissä tämä vaati tiimeiltä säännöllistä keskustelua teemasta ja sen ympäriltä, ja yhteistyö tiimin ulkopuolisten asiantuntijoiden kanssa oli keskusteluissa suureksi avuksi.

Yhteisen suunnan löytäminen

Viheliäisten ongelmien parissa työskentelemisessä tarvitaan yhteistyötä, jossa luodaan ymmärrystä kompleksisesta ja monimerkityksisestä ongelmasta, johon ei ole olemassa yhtä oikeaa vastausta. Eteneminen ongelman rajaamisesta kohti ratkaisua vaati tiimiltä yhteisen ymmärryksen luomista, vastaantuloa ja kompromisseja. Jotta tiimi voi edetä konkreettiseen lopputulokseen annetussa ajassa, tarkoittaa tämä toisinaan päästämistä irti yksittäisen tiimin jäsenen ideasta tai näkemyksestä. Tärkeää on löytää ja sitoutua yhteiseen suuntaan, jotta tiimi pääsee etenemään ongelmanratkaisun kanssa. Halu ymmärtää usein eri tavalla ajattelevien ihmisten ajatuksia sekä kyky liittää omat näkemykset muiden kantoihin ovat tässä tärkeitä.

Vaikka monialaisuus ja erilaiset näkemykset ovat lähtökohtaisesti välttämätön voimavara viheliäisen ongelman ratkaisemisessa, erilaisten asiantuntijoiden kuuluminen tiimiin ei vielä takaa, että asioita tarkastellaan erilaisista näkökulmista tai sitä, että laajempaa näkökulmaa hyödynnettäisiin. Tiimillä tulee olla myös kyky ja halu hyödyntää jäsenillä olevaa erilaista asiantuntijuutta. Asiantuntijuus ei ole vain syvää tietämystä, se on myös tapa ja kyky käydä keskustelua muiden asiantuntijoiden kanssa. Mukaan kutsuvalla ja rakentavalla keskustelulla saadaan parhaiten hyödynnettyä monialaisen tiimin laaja-alaista näkemystä.

Sammanfattning

Denna utredning fördjupar sig i sektorsövergripande teams arbete med lömska problem. Utredningen bygger på ett omfattande observations- och intervjumaterial samt beskriver verksamheten i fyra team inom utbildningsprogrammet Sitra Lab under coronapandemiåret 2020.

Utbildningsprogrammet fokuserade på att söka naturbaserade lösningar för utmaningar som gäller urbanisering. På grund av pandemiläget var det nödvändigt att deltagarna anpassade sig till nya slags arbetsredskap och hade förmåga att skapa en gemensam förståelse om komplexa problem som bearbetas på distans och möjliga lösningar till dessa.

Vi följde de fyra valda teamen veckovis under sju månader, från en bättre förståelse om problemet och vidare mot att begränsa det och testa en lösning. Teamets interaktion och rutiner samt hur dessa påverkade samarbete och kreativ problemlösning inom teamet var huvudfrågorna i vår observation. De viktigaste temana i utredningen blev en mångsidig förståelse av ett öppet problem, avgränsning av problemet och identifiering av försöksmöjligheter samt att finna en gemensam riktning.

Vi hoppas att utredningen gynnar förutom olika tvärvetenskapliga samarbetsprogram också alla organisationer som arbetar med lömska problem. Vi hoppas att den ska uppmuntra dem att skapa metoder som stödjer kreativ problemlösning samt teamarbete som involverar flera perspektiv.

Mångsidig problemförståelse

Utbildningsprogrammet Sitra Lab skapar en process (för kreativ problemlösning) där man försöker förstå problem och lösningar på ett mångsidigt sätt före en närmare avgränsning. För många deltagare skilde detta sig avsevärt från invanda handlingssätt – och krävde tålamod och nya attityder av dem. Problemets öppenhet, friheten i avgränsningen av problemet samt identifieringen av möjliga lösningar krävde att deltagarna söker nya tillvägagångssätt och tål osäkerhet.

Ett effektivt arbete förutsatte därför att teamen höll fast vid ett öppet tankesätt, i fråga om både en vidare förståelse av problemet och alternativa lösningar. Detta åstadkom frustration i vissa team. En del team var mer otåliga med att skapa en uppfattning om och avgränsa problemet. De ville börja med konkreta aktiviteter snabbare. De skulle ha varit mer villiga att avgränsa problemet eller lösningen redan i ett tidigare skede. Processen i utbildningsprogrammet Sitra Lab tvingade dock teamen att ha tålamod med att avgränsa problemet och lösningen på det alltför tidigt. I praktiken innebar detta att teamen erbjöds olika experters synpunkter (något som för sin del tvingade teamen till att uppdatera sin förståelse och sina synpunkter) samt olika metoder som hjälpte till att tänka på problemen och lösningarna på ett mer omfattande sätt än vad man var van vid. Ett nytt tankesätt och ett övergripande tillvägagångssätt gällande problemen upplevdes vara en värdefull lärdom från utbildningsprogrammet och något som deltagarna ville utnyttja också i framtida projekt.

Problemavgränsning och identifiering av försöksmöjligheter

Omfattningen och komplexiteten av lömska problem gjorde det svårt att skapa en konkret lösning. Många av teamen inom Sitra Lab hade utmaningar med att uppfatta och avgränsa försöket med ett mångfasetterat problem under utbildningsprogrammet.

Alla deltagare upplevde att det problem som teamet valt som föremål för arbete var viktigt och värt mödan. En del team kunde dock inte skapa en uppfattning om betydelsen av det arbete som utförs inom Sitra Lab för en större helhet. Avsaknaden av en gemensam syn gjorde att en del team tvivlade på hur deras lösning kunde bidra till en önskad förändring. Avgränsningen av problem och därigenom också identifieringen av försöksmöjligheter blev emellertid besvärligt då en gemensam syn saknades.

Med tanke på avancemanget i det praktiska arbetet är det därför viktigt att teamet kan koppla in sitt arbete till ett omgivande, större problem och samhällets behov. Inom Sitra Lab krävde detta att teamen regelbundet diskuterade temat och omkring det, och samarbetet med experter utanför teamet var till stor hjälp i diskussionerna.

Finna en gemensam riktning

För att arbeta med lömska problem behövs samarbete för att skapa en förståelse av komplexa problem med flera betydelser, till vilka det inte finns ett rätt svar. Avancemanget från problemavgränsning mot en lösning kräver att en gemensam förståelse skapas samt tillmötesgående och kompromisser. För att teamet ska kunna gå vidare till ett konkret slutresultat inom en given tid, innebär detta att man ibland släpper en enskild teammedlems idé eller åsikt. Det är viktigt att finna och engagera sig i en gemensam riktning, för att teamet ska kunna gå vidare med problemlösningen. Villigheten att förstå tankarna hos människor som ofta tänker på ett annorlunda sätt samt förmågan att koppla in de egna synpunkterna till andras ståndpunkter är viktig i detta avseende.

Även om sektorsövergripande samverkan och olika synpunkter i princip är en nödvändig resurs för att lösa ett lömskt problem, garanterar det att olika experter ingår i teamet inte att saker granskas ur olika perspektiv eller att ett bredare perspektiv skulle utnyttjas. Teamet ska också ha förmågan och viljan att utnyttja olika slags sakkunskap hos medlemmarna. Sakkunskap är inte enbart djup kunskap, utan också ett sätt och en förmåga att diskutera med andra experter. Med hjälp av en inbjudande och konstruktiv diskussion kan de omfattande insikterna hos ett sektorsövergripande team utnyttjas på bästa sätt.

Sitra Lab in a nutshell

Figure 1. Sitra Lab's training programme in a nutshell.

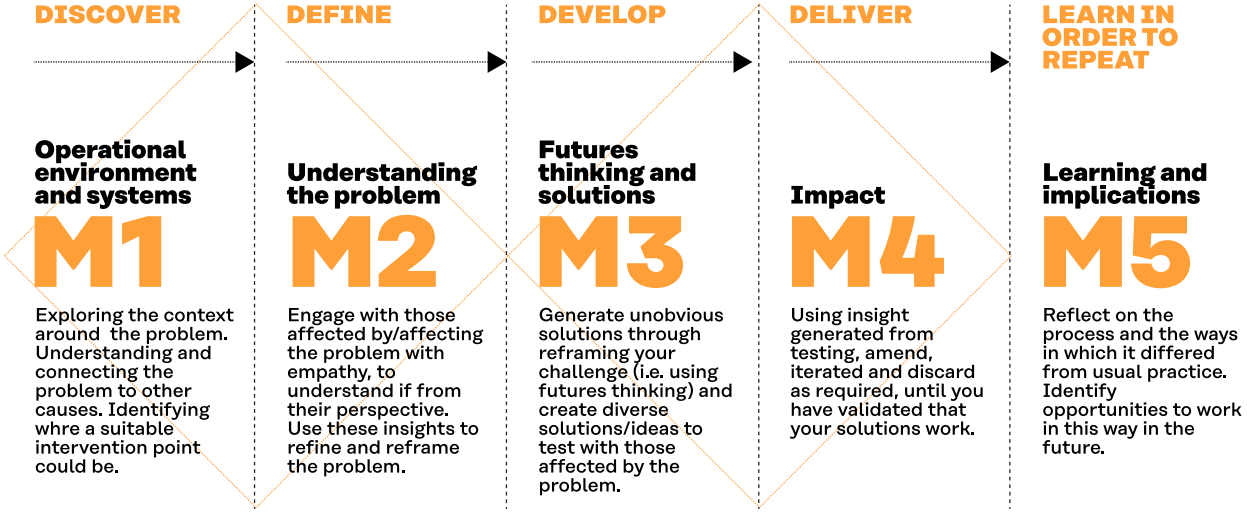


Table 1. Sitra Lab's training programme in numbers.

	Sitra Lab 1	Sitra Lab 2	Sitra Lab 3
Topic	Inequality of children and young people	Solutions from nature to the problems of urbanisation	Bottlenecks to democracy
Applicants (people)	231	284	272
Applicants (teams)		71	68
Lab days	12	12 (of which 1 face-to-face)	13 (of which 2 face-to-face)
Experiments	5	9	10
Experiment funding	40 751 €	72 000 €	80 000 €

Introduction – towards solving wicked problems at the grassroots level

The importance of collaboration across sectoral, disciplinary and societal divides in solving societal problems has been emphasised further in recent years. This has become painstakingly evident in challenges such as the COVID-19 pandemic and the climate crisis: to have an impact, a variety of changes – to legislation and business models, development of public services and policy, and behaviour of citizens –are often required. Most of the important problems affecting our society cannot be resolved by any single sector alone. The solutions such as those mentioned above require extensive collaboration between decision-makers, citizens, experts, businesses, and researchers. However, collaboration has turned out to be difficult, as the problems are complex, and the solutions often involve differences of opinion: a shared direction on the one hand and diversity of the required expertise on the other are a difficult combination.

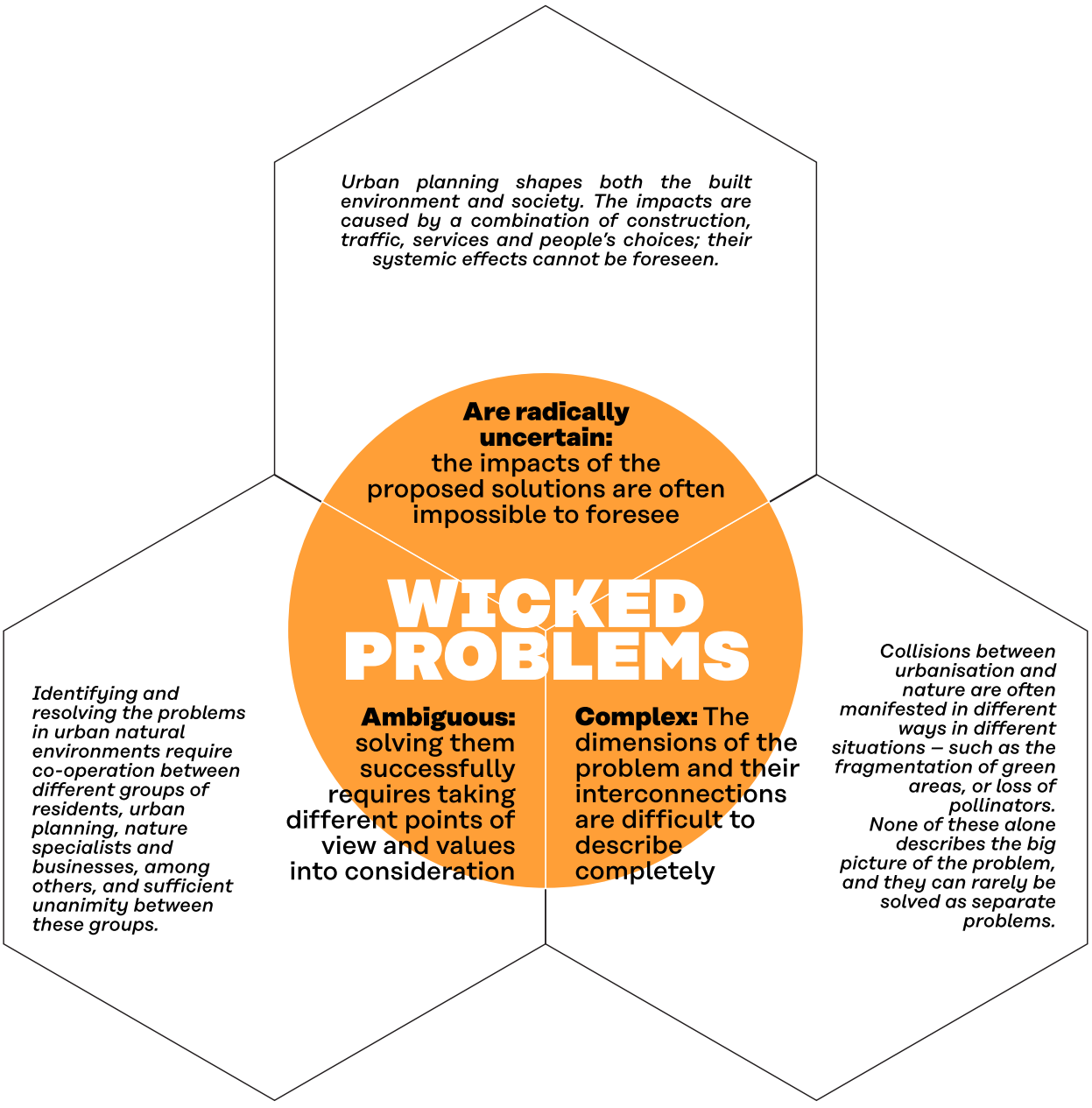
In this study, we will review how *multidisciplinary teams approach wicked problems and create a shared understanding of the identified problem and possible solutions during the practice-oriented training programme*. We will be reviewing team activity and working with wicked problems in the Sitra Lab training programme. In the study, we will highlight which factors promote creating a shared understanding of the problem and progress towards the possible solutions. We will also discuss the typical challenges encountered by the teams during the creative problem-solving process.

The study is based on the working of four teams during the Sitra Lab training programme of 2020, the year of the COVID-19 pandemic. The 2020 programme focused on finding and developing nature-based solutions to the **problems of urbanisation** (Further information about Sitra Lab: https://www.sitra.fi/en/projects/sitra-lab-2-solutions-from-nature).

Wicked problems often refer to the major challenges faced by our society, such as climate change, biodiversity loss, increasing social inequality or polarisation of public discourse. Wicked problems share three features that make them particularly challenging to solve. Wicked problems are *complex*; their complicated connections and intertwined relationships make merely describing the problems clearly difficult (let alone solving them). The problems include *radical uncertainty*; the images of the future associated with them are so unclear that forecasting the impacts of the possible solutions is often impossible. Moreover, wicked problems are *ambiguous*; they transcend social structures and bring together the needs of different groups of people in ways that readily give rise to conflicts between the needs. These three factors present those who take on wicked problems with a hard challenge: no party can solve them alone, while building a shared direction around an ambiguous problem that has radically uncertain consequences is difficult. (Ferraro, Etzion & Gehman, 2015). (See Figure 2.)

Wicked problems like biodiversity loss or the climate crisis thus do not, unfortunately, follow the division of labour in our society. It would be unfeasible to task any single organization with resolving them, and due to the ambiguity of such problems, even society committing itself to a simple goal, such as stopping climate change, is not enough by itself. Practical solutions, decisions and operational changes are required, and achieving them is difficult.

Figure 2. Three characteristics of wicked problems (Adapted from: Ferraro, Etzion & Gehman, 2015).



Fortunately, no individual solution has to be based on a complete understanding of the entire complex, uncertain and ambiguous problem (even if such 'complete understanding' could exist). Activities can focus on one local concern at a time. Researchers have described effective responses through so-called robust action: collaboration that consists of networks of interconnected goals and parallel functions as functional solutions; through co-operation, the wicked problem is solved locally or even globally – gradually, as if by a thousand lashes of a whip (See Ferraro et al., 2015).

A multidisciplinary and practice-oriented training programme such as Sitra Lab brings experts from different fields together to tackle a shared problem. Sitra Lab thus offers an opportunity to focus on the different areas of wicked problems.

Working with wicked problems requires creative problem-solving. Because the problems are complex by nature and there is no single correct solution to them, wicked problems cannot be addressed using conventional methods. The new information collected and better understanding created during the creative problem-solving process (for example regarding the operating environment, stakeholders or the problem formulation) have effects on the definition of the problem and thereby the possible solutions and selected experiment. New knowledge and accumulated experience mark out the future choices and action, which requires thinking to be open and action to be flexible.

The new information collected and better understanding created during the creative problem-solving process have effects on the definition of the problem and thereby the possible solutions and selected experiment.

Divergent and convergent thinking is typical of creative problem-solving (see e.g. Harvey & Kou, 2013). *Divergent thinking* is needed in different phases of the process, such as to understand the complex problem and associated operating environment more extensively or create alternative solution options. To frame the problem and specify it more precisely, participating teams need to understand it better and make sure that their own thinking is not built on false or excessively strict assumptions. This calls for collaborative action: for instance, seeking to better understand the views of those concerned or impacted by the problem or its suggested solutions, and acquiring problem-related information by using the views of different experts. Since there is no single correct solution to wicked problems or parts thereof, teams must approach their tasks openly, considering what kind of activity facilitates progress towards practical and effective solutions. At the same time, they need to remain open to alternative approaches and solutions.

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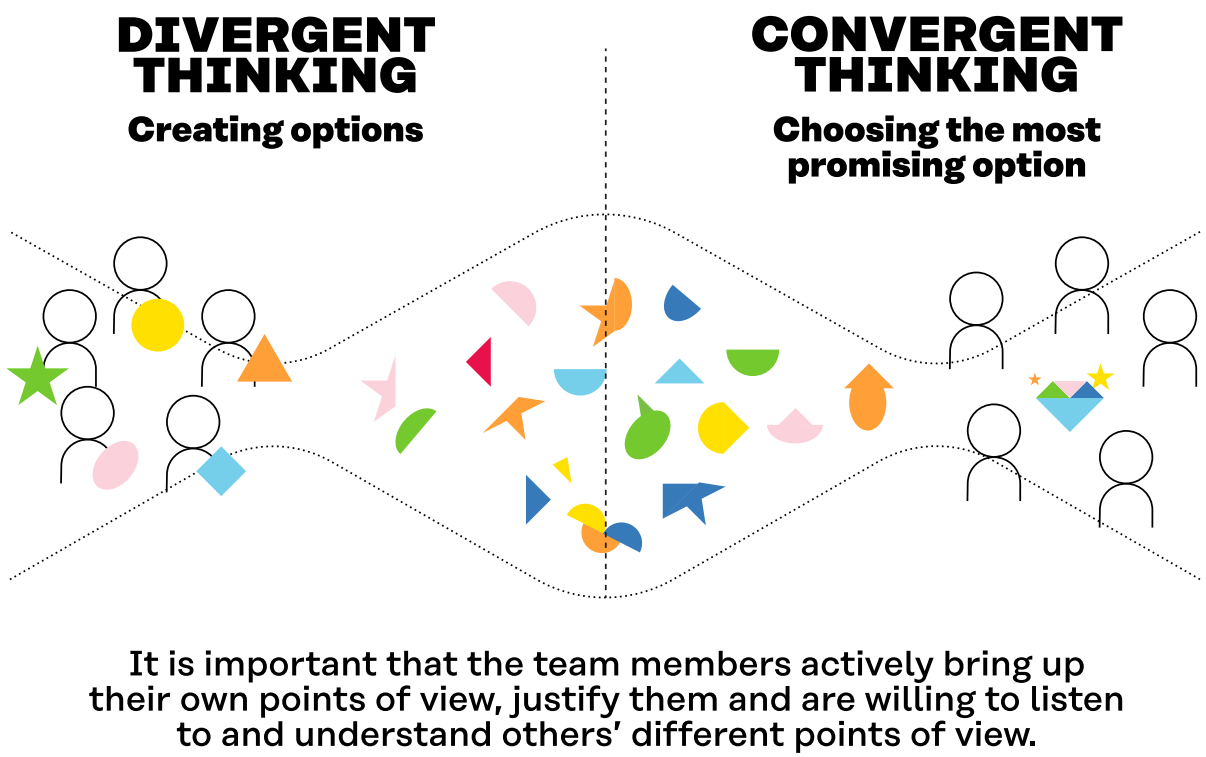
The team must create alternative solutions to the problem at hand while selecting the one that seems the most promising at that time. Members need to be able to consider the created alternatives from the point of view of potential effects and feasibility, considering the resources

Figure 3. Divergent and convergent thinking in creative problem-solving.



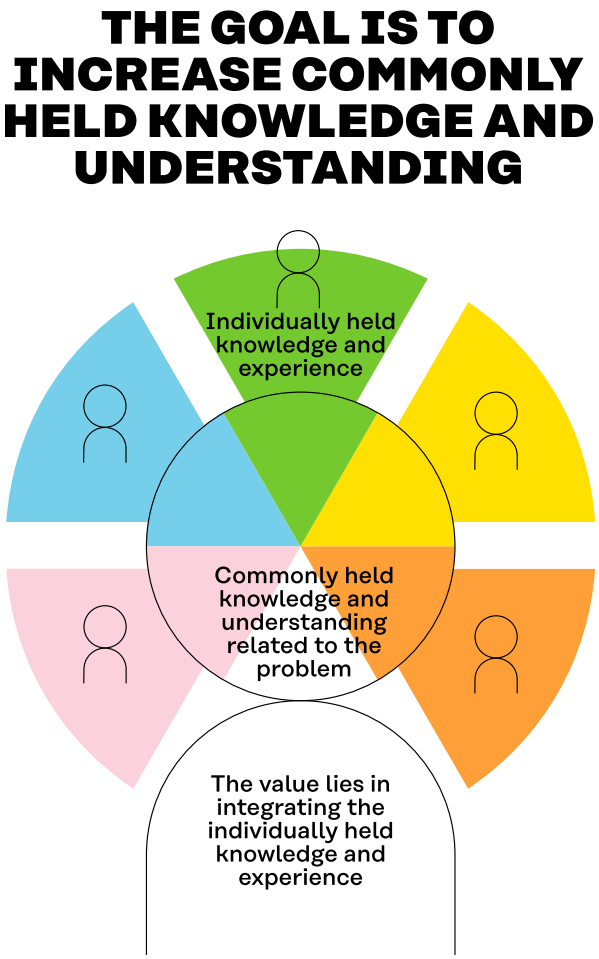
A multidisciplinary team composition provides more extensive expertise, knowledge and experience, which benefits the team's creativity and supports creative problem-solving, with different points of view being brought up and considered more thoroughly.

existing at the time. The possible other impacts of the solution options should also be assessed so that the solution will not give rise to new problems.

Considering the alternative solutions and ultimately choosing one for further development requires *convergent thinking* from the team. Convergent thinking is also needed so that the team can frame the problem to a size and shape that can be approached and solves the needs of all relevant stakeholders as well as possible. This does not only require considering the different options and listening to the experts' views, but also the ability to justify one's point of view. Moving between divergent and convergent thinking is not linear; successful teams are able to move between the two approaches throughout the process of creative problem-solving (see Figure 3).

As said, the complexity and scope of wicked problems requires *multidisciplinary and cross-organisational collaboration*. A multidisciplinary team composition provides more extensive expertise, knowledge and experience, which benefits the team's creativity and supports creative problem-solving, with different points of view being brought up and considered more thoroughly. On the other hand, the

Figure 4. The asymmetry of information is the starting point of a multidisciplinary team.



multidisciplinary team can occasionally interfere with the process of creative problem-solving if it interferes with arriving at a shared understanding. From the perspective of creative problem-solving, it is important that the members of the team share their ideas and views with others and concentrate on listening to others' ideas and views. In order to develop practical and effective solutions, the different experts need to build new associations on others' ideas and thoughts, and combining them can create genuinely novel solutions (Harvey, 2014). There is often asymmetry of information in a multidisciplinary team – those representing a different field or point of view have knowledge and experience that the others lack. The value of a multidisciplinary team becomes evident when the knowledge and understanding held by different individuals can be brought together with other points of view. (See Figure 4.)

From the perspective of creative problem-solving, it is important that the members of the team share their ideas and views with others and concentrate on listening to others' ideas and views.

Figure 5. Collection of data during the Sitra Lab 2 training programme.

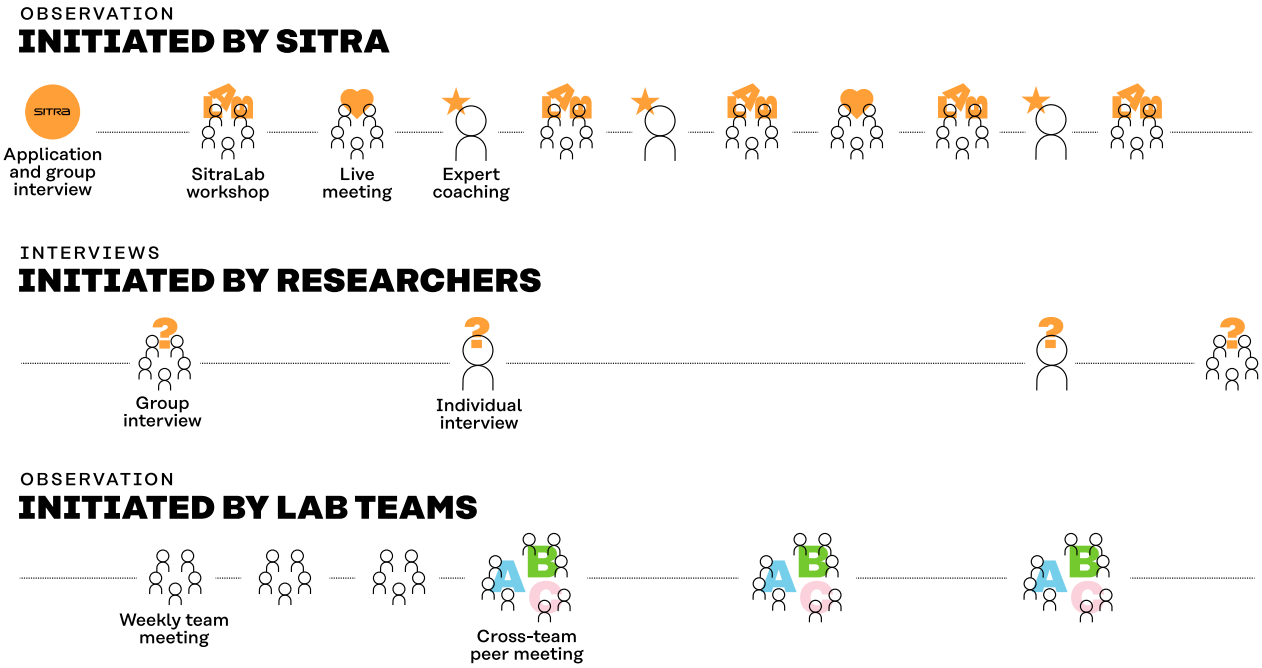


Table 2. Data in Sitra Lab 2 programme.

Sitra Lab workshops	52 pcs / 54 hours 40 min.
Live meetings	5 pcs / 9 hours 20 min.
Expert coaching	9 pcs / 8 hours 30 min.
Group interviews	7 pcs
Individual interviews	28 pcs
Weekly team meetings	110 pcs / 150 hours
Cross-team peer meetings	3 pcs / 3 hours

We observed the teams of the Sitra Lab training programme, allowing us to observe how multidisciplinary teams aim to use the expertise of the professionals in different fields included in the team when working with wicked problems.

Our study is based on extensive empirical observation and interview data. We weekly observed four teams taking part in Sitra Lab 2 for more than seven months between August 2020 and March 2021.

We observed the teams at Sitra Lab training days, mentoring by experts, cross-team peer meetings and the teams' own weekly sessions via Teams and Zoom (see Figure 5). In particular, we observed how the teams created a shared understanding of the observed problem and how they could proceed towards a possible solution. We paid particular attention to the interaction and practices of the team and how they influenced the team's collaboration and creative problem-solving.

We made comprehensive notes of each observation session, paying particular attention to the team's ways of working and interaction practices. We also had regular discussions with the facilitators of Sitra Lab to obtain the views and observations of the training programme facilitators regarding the progress of the teams.

The observation material amounted to ca. 220 hours from 185 collaborative work sessions (see. Table 1). In addition, we interviewed the selected teams and team members at the start of the training programme, halfway into it and at its end, conducting a total of 35 interviews, each lasting approximately an hour. All observations and interviews were recorded (also video was recorded in the observations) and transcribed.

How to create broad understanding of the problem and how to frame it, how to identify the experimentation opportunities and how to find a shared direction emerged as the main themes of our research.

In this study, we describe team-level factors that challenge or promote working with wicked problems in a situation in which the creative problem-solving approach is a new concept to many. In the next section, we will review the experiences of the observed teams on working with complex problems, and our findings on factors that promote creative problem-solving. Finally, we present our conclusions regarding what could be taken into consideration in supporting teams that work to respond to wicked problems when developing the training programme.

Findings – through shared understanding towards a solution

During the Sitra Lab 2020 training program, the aim was to find solutions from nature to the problems caused by urbanisation. Most of these urbanisation-related challenges were primarily linked to conflicts between the existing social structure and biodiversity objectives.

This objective gave the participants in Sitra Lab a wicked problem to tackle. The work of the teams focused on a problem that matched the characteristics of a wicked problem described in the beginning, identified by the team members based on their expertise. For example, Sitra Lab teams created solutions for diverse city planning that supports the identity of the area and climate sustainability of urban blocks. The problems were complex and without exception ambiguous, and the future scenarios were very unclear: the perceptions of different groups of citizens and experts differed significantly, and the targets of the teams' work were seen very differently, depending on the point of view.

Sitra Lab's teams operated in a challenging environment. Nevertheless, we think that the challenging situation brought up the best sides of the teams and Lab. Sitra Lab taught the team members creative problem-solving and created a space in which the teams developed (partial) solutions to wicked problems. The ability of the teams to combine experts in different fields into a single working group made ambiguity an important value in the work, and the Lab ways of working encouraged the participants to embrace ambiguity in developing the solutions. Working in teams challenged most of the team members to encounter views that were unfamiliar to them and forced them to combine their own expertise with the points of view of others and explain their ideas to people from different backgrounds. This both strengthened the solutions found by the teams and significantly expanded the expertise of the participants in the problems being solved.

The Lab emphasised that the work does not aim to create a readymade solution but an interim stage, a better understanding, i.e. the ability to continue the work after Sitra Lab and learn more about the topic. This also describes the dual objective of the programme well: the programme both wanted to promote solving the practical problems observed by the teams and train the team members into competence members of teams working with wicked problems in their home organisations. This dual objective strongly coloured the work of the teams. We will return to the theme below, as we report our detailed findings.

What was characteristic of the Sitra Lab we observed was the COVID-19 crisis – a wicked problem – that changed the plans regarding the implementation of the Lab. The start of the training programme was postponed by approximately four months from the initial plans, and the practical implementation was moved online. The training was completely carried out remotely, with the exceptions mentioned below.

Working remotely in the new situation required the participants to quickly adapt to new kinds of tools and be capable of creating a shared understanding of the complex problems and their potential solutions worked through remote connections.

Some of the teams were able to adapt to the new conditions quite swiftly, while some of the teams considered the recurring remote meetings to be difficult with the non-linear

progress typical of wicked problems. In fact, many felt an emphasised need for creating structures that support their own work in a situation in which both the creative problem-solving process and remote work were new things to most.

Next, we will introduce the three main themes that emerged in the study; they are linked to working with complex and ambiguous problems:

- creating a broad understanding of the identified problem
- framing the problem and identifying opportunities for experimenting
- finding a shared direction in multidisciplinary teams.

The creative problem-solving process, which involved approaching problems holistically and the teams themselves framing the problem and brainstorming possible solutions, differed from many participants' previous ways of working.

Working with wicked problems in the Sitra Lab training programme

Sitra Lab created a space and courage to think and act differently.

Sitra Lab was mentioned as a significant facilitator that provided room for a different mindset and made working in a different way real. The stepwise structure of the training programme, which involved approaching problems holistically and the teams themselves framing the problem and brainstorming the possible solutions, differed from many participants' previous ways of working. This was considered to be liberating, but many participants also reported that they were confused over the additional work and surprises that this freedom brought.

> This kind of bottom-up approach, instead of the employer or funder or anyone giving orders, [focusing on] what you like and what's important and how change could be achieved. It's a different process. It can be quite confusing: normally when you work, you are continuously told that this is how it's done and the schedule is this and the budget is that. And to then suddenly stop and think about what's possible is a mind-blowing experience."

> When this Sitra project began, the permission for a very free and somewhat change-oriented mindset in general was a very big thing. When you have sort of forward-looking activity in your day-to-day job, your own perspective can become more linear without you even noticing it, you sort of just take things forward and perform and then you get the job done by when it needs to be done. So I really liked it a lot to have the permission to open all the windows and also look for the other answers that you might have at the moment for those ways of realising it."

Keeping the problems and solutions open requires patience and readjustment of attitudes

The participants stated that the open attitude towards the work carried out in Sitra Lab was an important part of the training programme. They felt that the openness of their own thinking promoted the possibilities of the team's work succeeding. For example, this meant openness regarding the possibility of re-defining the problem once information and understanding had accumulated.

> To my mind, joining Sitra's activities requires indulging with an open mind. If you do not start with an open mind, you won't get results. So if, say, just one member of the team has an advance notion from day one that this is how it's going to go, it won't work for the team, because the process will take you along and evolve. The environment is changing and you get new

information from the team members and Sitra and mentors, and new points of view, perspectives into things and so on. So of course everyone's views changed during our process. And it requires that openness. To be prepared to shift one's mindset a bit in that direction after receiving new information."

> Lab did give food for thought. And like... I noticed quite early that, OK, I can't stick with the same old patterns, that I have to start to open up my mind and listen to other opinions and other views, which were provided by Lab and my teammates."

The openness of the problem, freedom of framing the problem and identifying the possible solutions required the participants to seek new approaches and tolerate uncertainty.

Many of the members of the observed teams highlighted how at first they had trouble perceiving what could (and should) be achieved during Sitra Lab. Several team participants' hopes to gain from Sitra Lab insight into "what we're supposed to do" were repeated both in interviews and observations. The openness of the problem, freedom of framing the problem and identifying the possible solutions required the participants to seek new approaches and tolerate uncertainty.

> When we joined this project, the whole thing was insanely unclear and foggy – what will actually come out of this and when will we be told what we should be doing. We had those concrete, somewhat childish questions – after all, nobody ever tells us that it takes shape over time. [...] There was quite a lot of tolerating uncertainty involved in that early stage. In a way, everyone expected that someone from Sitra – please tell us what we're supposed to start doing. It was even a bit comical in a way, but perhaps it's part of the nature of this process."

The start of the training programme included an "incubation phase" in which the teams were encouraged to think about problems and solutions more broadly and better understand the operating environment of the problem. During this phase, the teams worked with a vague or insufficiently specified problem. This phase was considered to be challenging, and many participants felt that it was unpleasantly long. On the other hand, the abstract phase was very rewarding for some of the teams. Different scenarios and opportunities were considered during it without going into concrete things about what should be experimented with in practice and how. The phase was considered to have laid down a foundation for the subsequent work and many thought that it shook the mindset free from the customary way of doing things.

> The challenges were perhaps related exactly to this... fragmentation in my own head, perhaps because of that there were so many thoughts emerging in the autumn. In a way like, OK, then [the remaining time decreases] for that completed work, but I still feel like my head is just always looking in several directions. [...] In a way, it was quite a good thing later that those things had been reviewed a lot. And then what resolved this was that we just started to work based on one of these directions."

Some of the observed teams' members would have been willing to frame the problem or solution already at an earlier phase, even though they could afterwards identify the benefits of keeping it open. The process of the Sitra Lab training programme forced the teams to have patience regarding the framing of the problem and solution. Because many were familiar with proceeding in a more linear way in solving a problem,

The participants felt that getting different influences and perspectives through the Sitra Lab process was rewarding. At the same time, it was occasionally challenging to link them to the team's problem at hand and solving it.

the openness of the start and refraining from framing the problem required conscious patience from many participants. The need to see where the team's current thought work will lead (or where it should lead) and thereby perceiving a clearer goal already in an early phase was strongly present in many teams. The confidence in the process taking them forward was lost at times, and the teams felt frustration about "staying in place." Only after the ideas had matured and the process perceived better could the participants better see what was the purpose of keeping the problems and solutions open from the point of view of their problem-solving process.

> **Personally, I think I could have been more prepared to frame it a bit earlier, but in a way I of course [understand] the benefits...the benefits of things remaining open for a long time so we could collect influences there. That you didn't have to [follow a tight schedule] but it was open for a very long time[...] We were challenged to do that for quite long and then we were exposed to these new things for quite a long time. It allowed the team to internally process it for longer."**

The Sitra Lab training programme offered an extensive range of talks by experts in different fields and facilitated workshops, many of which had given the participants meaningful insights at the personal level. The participants felt that getting different influences and perspectives through the Sitra Lab process was rewarding. At the same time, it was occasionally challenging to link them to the team's problem at hand and solving it. At times, the participants had trouble perceiving how the talks and points of view that came through Sitra Lab could be linked to the team's perceived problem. When the teams were already impatient to more concretely get involved in defining and framing the problem (i.e. convergent thinking), new information frustrated them. New information unavoidably aimed to expand and keep the teams' thinking divergent.

> **Recently, Sitra has provided lots of terribly inspiring things. There are joint big Zooms [between all teams] and then there are mini-Zooms where we are in a smaller group, [and both] have really inspiring things. And then there are these team-specific mentoring sessions, which provide yet again new inspiring things. And the data processed or things that expand – in a way there is so much stuff on that shelf to take that you also sort of get the feeling that, let's use a metaphor, if I have already chosen a bag of sweets at the shop that I was quite satisfied with, but then I notice that, damn, there's another shelf there that is a lot longer and there are really good-looking bags of sweets there, too. Then perhaps I put back the bag of sweets I already chose and go to that shelf until I can pick one of them. So in a way, it is a positive thing, but it might have given me lots of additional things I need to consider."**

Interestingly, some teams did not have practices for introducing the information received and created in different situations to the team. This was, for example, the case in a situation in which some members of the team could not participate in a training day workshop. Even though the actual workshops focused on the team's shared problem

and created important understanding of the matter, this information was not always systematically relayed to the absent members. This could create gaps between the team members in how they viewed or understood the problem.

> "There were, like, really good and vivid lectures that gave rise to new kinds of thinking. And then – we didn't really find out right away how we should link these [thoughts] with this thing of ours."

> "But I have to say that perhaps that was the biggest agony for me in it, wanting those concrete things there. So we were simply going around [...] at such a high level, going through such strange and remote things that it was challenging to, like, link with how I felt. I was wondering how we will ever find the models for acting here [in our own work]. But perhaps it's sometimes good to go far to see near, and thereby slowly approach, kind of one phase at a time. That's how it then began to unwrap."

On the other hand, several participants felt that the views of the different experts supported their personal process as changemakers. At times, the participants filtered the different points of view and new information mainly based on their own personal learning process, contemplating, for example, what different thoughts could add to their expert role and acting in it. Here, the ideas and insights that emerged from the different points of view and new information were not necessarily connected to the problem identified by the team and solving it.

> "And one thing that was strong for me here was taking in the lessons learned. I then understood that, OK, all the other teams are also there and have lots of information. So, I will now really use the time to learn about all the things it [sustainable landscaping] influences and how it can be used. Although a few of the Lab lectures – how should I put it – were linked to this, they were somewhat ethereal. They really made you stop and think, OK, I can't immediately digest or adopt this whole, but if there's just one bullet point or something that starts to take my own thinking and opinion in some direction, I have to find it."

Different influences and processing new information slow down the more concrete doing. The participants identified the need for digesting the high volume of new influences and inspirations alone and in a group. However, the teams had the need to proceed towards more concrete activity with their own projects. The team's joint meetings only rarely revisited the matters and themes that emerged in the training programme. Some of the teams identified that diverse influences from experts and processing new information stopped the more concrete level of activity in the team.

> "As part of that pretty high volume of information [...] perhaps we didn't have the capacity that we would have needed to process such a volume into a clear progress plan. We have perhaps just gone through these topics and then new things emerge, we review them a bit and that's important, too, I find it important, but all the time we have sort of been processing it just a bit. Our main function, however, sort of still stays there in the actual experiment and what we're really doing ourselves, and this has stayed in place. [...] That this processing of new things has perhaps stopped that level of activity already proceeding in the background."

Different influences and processing new information slow down the more concrete doing.

The nature of team activity changes when eyes are fixed to the concrete experiment

Once the teams had created a more extensive understanding of the identified problem, the operating environment of the identified problem and its key stakeholders, many of the teams experienced challenges in perceiving and framing the experiment conducted during the training programme concerning a multi-faceted problem. The extent of the wicked problems and them remaining comprehensively unsolved created a conflict regarding a more precisely framed experiment. In all of the observed teams, Sitra Lab work was considered to more or less serve the more extensive and longer-term goal and to accelerate subsequent activity and make it more concrete. The teams switched between the framed Sitra Lab experiment and a more extensive agenda. Combining these two worlds into practical action was considered to be challenging.

> Yeah, that experiment. We've been wondering what our experiment is. It emerged in the [live workshop in the] Nuuksio wilderness that there were other teams there, too, whose experiment design had been a bit slow, but as our idea is in a way so multi-faceted, [we struggled to find] the suitable small piece that we would design, without forgetting the final goal that we'd want to reach."

The extent of the wicked problems and them remaining comprehensively unsolved created a conflict regarding a more precisely framed experiment.

> We have the [development target and] specific goals, but when we listened to these very theoretical models of thought, I did not immediately get an idea of how to combine these. [....] I may also have thought that we have this very extensive Sitra world and then we have this small [development target]. Which is what we're producing out of it."

The openness of the initial phase of the Sitra Lab process and the need of the participants for getting towards a more precise framing of the problem created for some participants a need for holding on to the ideas of like-minded team members. This provided a feeling of security amidst the complexity by providing a fixed point of departure for further development.

> In part, it could also be that especially in the very beginning when it was more ambiguous, there was sort of a higher need for grasping such [thoughts] that seem to point more or less in the direction you'd regard as progress. [...] And in a way it could be that you didn't give similar feedback on those things [suggested by certain team members] that were interesting and good, but didn't equally serve your own need to push forward, maintain structure and build things."

The nature of activity changed once the problem was framed and thoughts were fixed to the concrete experiment. Once the teams had framed the problem addressed more precisely and directed their attention to the experiment to be implemented, also the nature of the team's activity changed in most of the observed teams. As part of the schedule of Sitra Lab, the teams prepared an experiment plan, describing the planned experiment, its implementation and what they aimed to learn from its results. At this stage, the teams' work shifted towards

It is good to note that different people can become excited in different phases of the process. For some, the initial process phase in which everything is still possible was the most rewarding phase of the entire process. For others, the openness of the early phase causes frustration, and uncertainty over the direction of the project took up mental bandwidth from other activities.

convergent thinking and the teams began to make concrete decisions concerning the experiment to be implemented. For some of the teams, the concreteness and the move to a phase in which the framework of activity was clearer was a relief. For some, though, the move from the phase in which "everything is possible" to the phase in which "you have to know what you're doing" was frustrating. The feelings relating to the change in the nature of the work also differed between the members within the teams.

> Of course, it now makes you laugh a bit that at times there were phases where we were drowned in influences, mindsets, approaches and other. Approaching from every angle, going really every direction in space, and probably everyone was thinking that we really want something concrete, too [laughs] – landing on some planet, starting to explore it [laughs], anything, as long as it's concrete. And now [that] we've reached it, it is quite rewarding to me as a concrete person that we are no longer floating in space in another galaxy, but here and there is a focus on something."

> I somehow remember how [our work] began to shift from thoughts wondering and considering at an abstract level. When it changed into what it is now – taking something forward with determination, it somehow changed – at least momentarily – how we together engage in our mental work. And you could see a little frustration of a kind in that at least among some [of the team members]: that sort of changed totally."

It is good to note that different people can become excited in different phases of the process. For some, the initial process phase in which everything is still possible was the most rewarding phase of the entire process. For others, the openness of the early phase causes frustration, and uncertainty over the direction of the project took up mental bandwidth from other activities. As the nature of the work changes, the roles in the team may need updating. Also, the roles of different experts can be emphasised in different phases of the creative problem-solving process.

> And then suddenly I noticed that when we proceeded to this strict realist phase, a sort of impatience arose that my own role was all of a sudden something that is not a given for me, like 'hey, what's next, now we're doing this, we have two days' or this, kind of project manager vibe emerged at times. That was funny."

> The brainstorming phase – or early in the project I felt that introducing those certain points of view has been a natural [role] for me, connected to my professional field, landscaping practices and its decision-making processes [...]. I'm at my best in that brainstorming side of things – combining things and that concept-level brainstorming – and then in totally hands-on stuff. But in between there is a part where maybe I'm just sort of

filling the blanks [...] looking at the flow of my own activity, there's a sort of a personal plateau at that point."

> I like doing things – starting up and getting background information is always necessary, but when there's the spirit that we're getting forward and getting to do things and you can see concrete results ahead, that's a very pleasant phase, I like it."

It was interesting that in some cases, framing the problem more precisely helped some of the team members that had been more in the background take an equal and stronger role in working.

> Perhaps those thoughts [of the speaker and another team member] have also been a little similar. And then as we had these roles, we have then passed on [ideas] to each other. So this may be something that becomes a sort of a cycle then. You get reinforced by each other one and then it can be difficult for others to intervene. [...] And I don't know but it could be that somehow the fact that [these two idea generators] have had a clear target orientation there. And then even if the team hasn't actually known what we're doing these two have nevertheless pushed forward at that point when there has still been more uncertainty. Now that it is becoming a bit clearer what we're doing, it has perhaps been also easier for the others to take that leading role."

Significant changes in the teams' ways of defining their problems or perceiving the solution they developed almost all emerged from situations in which team members had discussed their work with someone outside the team.

After the open and ambiguous initial phase, several teams had the need for increasing the focus of the work and concentrating on more concrete activity. Notably, once the object of activity became clear, thinking was no longer explained much in terms of considering the solution options. For several teams, the more precise framing of the problem went hand in hand with framing the experiment.

Discussions with people outside the team helped to turn the direction of problem-solving

Significant changes in the teams' ways of defining their problems or perceiving the solution they developed almost all emerged from situations in which team members had discussed their work with someone outside the team. An external point of view was longed for to guide the process and make sure that the team is not going completely in the wrong way relative to the other teams. The participants reported that comparing the situation of the projects with other teams helped to learn from others' solutions as well as to assess the progress of their own work.

The teams met with other Sitra Lab teams mainly in the training days on Zoom. The training days worked on each team's problem-solving with various methods. In addition, the days included both open and theme-specific pair or small group discussions with members of other teams. The discussions were considered to open up people's own thinking and give a new perspective and ideas for working with the problems. In general, peer support and insights of other teams were considered to be valuable, and many of the participants actually commented that networking had been a major personal goal of the Sitra Lab training programme. Even though networking with other Sitra Lab teams was more challenging due to the pandemic situation, the insights of other participants were felt to be an encouraging factor.

One of the most significant turning points for many teams was the live workshop organized by Sitra mid-way of the training programme. There, the teams met with each other face-to-face and got to tell other Sitra Lab participants their thoughts, listen to others' views and have their ideas reinforced.

> **So I guessed right away that it's important that others are considering similar questions in different projects. But here you can see that yes, that's just it – you see that they have exactly the same questions, even if the other [teams] have a different kind of a project."**

One of the most significant turning points for many teams was the live workshop in Nuuksio. There, the teams met with each other face-to-face and got to tell other Sitra Lab participants their thoughts, listen to others' views and have their ideas reinforced. Many of the participants stated that the day had been a point of process in which many things clicked together and it became clear to them what they are aiming at as a team during the process. During the day, the teams were to introduce their framed problem and current view of the solution at two occasions: first to the other Lab teams and after that also to the external experts and stakeholders that joined. The iteration that took place during this short time span and clarifying the message to others made the idea of the project focus clearer.

Speaking thoughts aloud to others also clarified them to the team itself. Once the teams had a better idea of what the other teams were working on, it was easier for them to identify the interfaces between the teams, share ideas and get mentoring from others. Because the Sitra Lab was arranged through remote connections due to the COVID-19 crisis, some longing for face-to-face interaction was also crystallised in these days.

> **In and around [the live workshop in] Nuuksio, we were somehow able to shape ourselves an image of what the outcome will be like. Until that, after all, it remained quite open, [...] then it perhaps began to take form what the outcome will be, and what the follow-up will be, how to take the thing forward."**

> **Well, it was of course emotional and somehow impressive when being there in Nuuksio and meeting up and you somehow realised how much you can get out of it when there are like people physically present and perhaps there was some nostalgia of what it could have been like. That there's like [...] a sort of slight feeling of forcing it in this [distance work], compared to what the mood was immediately when we were there, breaking loose of everything else and actually thinking about these."**

Sitra Lab also offered the teams an extensive range of mentoring by outside experts. This input by external mentors helped many teams to find the red thread of their work. In addition, the mentors gave many an insight that ultimately clarified what they were actually pursuing as a team.

> **I sprang up 10 centimetres from my chair when I had that eureka moment during the mentoring: 'yeah, that's exactly how it is'. That was a relief for me and made things understandable."**

> **A bulb lit up in that Sitra mentoring [session ...] We had been in some pain with our experiment in general as we had so many wishes and thoughts but [couldn't see] what the experiment is. Somehow, they just met like hey, this can be our experiment because [this**

idea] can be like put in an experiment jar, so to say. In many other thoughts of ours, it was quite difficult how to draw [borders] around it that 'this is the experiment'."

In addition to the experts who came through Sitra, some of the teams were also active themselves in getting external experts to visit the teams' own meetings. In some cases, the self-arranged meetings turned out to be very essential to the team's outcome.

Even though remote participation caused challenges in networking with other teams, some of the teams were active in networking with others, forming cross-team peer meetings around similar themes. At these meetings, the teams reported on the situation of their own projects, shared their views of others' projects and engaged in active discussion around the shared interest. Networking more closely with other teams was considered to be a factor that strengthened their own activities.

> It makes you stronger when you know what the neighbour is doing. You can tread more confidently when you know you're more there than just some vague quagmire."

Instead of the participants emphasising specific tools learned in the training programme, they felt that they had learned a new type of thinking and approach to complex problems.

Participants wanted to adopt the mindset of re-defining the problem or goal and updating the plans along of the project.

Changemakers adopted a holistic approach to problems and systematic methods

The participants reported that the most important thing they remember from the Sitra Lab process was the mindset of holistically approaching problems and solutions. Instead of the participants emphasising specific tools learned in the training programme, they felt that they had learned a new type of thinking and approach to complex problems. A better and broader view of the problem and solutions was felt to have given a new valuable perspective and will to understand problems more comprehensively and extensively before the more precise framing and focusing. It was interesting that this holistic approach to problems was also something that caused frustration in the open and non-specific early phase of the process.

> One thing I got [from the program] is... the way that all [the events] shared that change-making [approach] - departed from something big and approached another thing, and then perhaps opened up the thought more and more... So even though there were different tools and methods, perhaps they all shared a very similar background philosophy. So, I feel that stuck to me: I didn't want to just push the issue forward even in my own head, but always wanted to take that detour and open the discussion, and only then end up [with a solution]. [This] was really nice in this group. We very openly engaged in that discussion [in our own team]."

The participants also brought up how they had learned about the impact of the creative problem-solving process during the Sitra Lab process, which gives room for thinking in another way and creating understanding of the problem along the

journey. Participants wanted to adopt this attitude of openness to re-defining the problem or goal and updating the plans along the project also in their other projects.

> **Often in a project that has a clear-cut objective, what the project team does is somehow determined by that objective. This time we have had a very vague objective but a certain path to travel. So, perhaps we have also looked at our work through quite different eyes. And in a way it feels like you have brought a little of this to those other [own work's] project teams – at least to your own thinking. [We have] looked at it from the point of view of the process and not just focused on reaching the objective. I think this process has probably also created a lot of useful things. If nothing else, then an understanding of that matter to all of us."**

One named special feature of the creative problem-solving in Sitra Lab was the team's collaboration in which the problem being solved was looked at at the same time through different expert points of view instead of working on the problem one by one. Working together and creating understanding were considered to be valuable: "the less silos, the better".

> **I've been thinking of how this [team] has made available and brought together three completely different backgrounds and areas of expertise – and we have even been able to discuss well across these points of view. Usually we might make all plans from a single point of view, at someone's desk, and then someone else would comment on it. But now we've looked at that big picture all the time from three different perspectives and aimed to include also some external perspective in it, like all at the same time."**

> **Now that we're actually doing and thinking and turning around and taking maybe five steps back and then to the side and then maybe one step forward. In a way this has been a very big thing to me in that it has given me a lot of strength for my day-to-day life. It's so nice to get to do that joint development work in which everyone is involved."**

Teams went only rarely back to the tools and methods introduced during the shared sessions in their own problem-solving efforts. The tools were considered to have worked as a support and initiator of thinking in the workshop, but teams did not often see the need for returning to them. However, many of the participants felt that the scalable tools and methods coming through the training programme were useful in their own work. Participants also considered the systematic approach to the problem useful for their work after Sitra Lab.

> **I've thought that in a way, with the training provided by Sitra, I can address those complexity challenges or development challenges perhaps with a little different methods in my own work."**

The Sitra Lab training programme created faith in making change and got the teams off to a good start when they were assessing their own solutions. This was a practice participants wanted to maintain also after the Lab.

> **This has also brought a lot of [meaningfulness to the work] and strength and, like, really finished results that can be implemented right away. I'm really satisfied with that, even though we haven't reached the finish line yet."**

> Sitra Lab got us off to a very good start with this topic and perhaps made us believe that we're able to make a change in something so big. In that sense I think Sitra Lab has given us quite good confidence that it will be worth it in the future as well."

What promotes the resolution of wicked problems in multidisciplinary teams?

Benefitting from multidisciplinary teamwork in creative problem-solving requires consciously giving – and taking – space

The teams we observed during Sitra Lab included experts in different fields and representatives of different organisations. Even though all the teams were multidisciplinary, some of the teams had several experts in the same field and/or representative of the same organisation, while in others, each member was the only expert in the field and only representative of their organisation. As a rule, being multidisciplinary was a critical resource in solving wicked problems. New insights opened up the perspectives and team members' own thinking.

> It's been an astonishing addition to how each of us is only able to think about things from one perspective, or perhaps add another one that is little bit different. But now that I get a completely different perspective to it, sometimes I really have to stop to think about what is actually happening here, what that perspective gives to this. Because it opens it up, or takes your own point of view in a completely different direction. So it's like... like really inspiring."

> Since we genuinely come from such different backgrounds and are here voluntarily, the dynamics are probably different from many normal work-related things. Based on that first meeting or something, you really can't guess what the other person has to offer to it."

However, participation was more equal in some teams than in others. The teams with all members representing different fields or points of view more naturally took on a clear and active role. In these teams, the responsibility of individuals for bringing up their own points of view or expertise is emphasised. On the other hand, in teams with several members representing the same point of view, there was a need for different kind of thinking and inputs that would have opened up their thinking. If the points of view that open up thinking were missing, the teams seemed to more easily get "caught" in the constraints of problem-solving instead of questioning existing things and finding potential solutions. In teams where one perspective dominated over others, conscious action was required for keeping the representatives of another field or perspective active in the discussion.

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> In our team, it could be just that we all are looking at it in quite similar ways, [...] I've been thinking that it might be good for the team to include someone who'd ask stupid questions. [Now] we

The ability to combine one's own views with less familiar perspectives was essential to effective teamwork. In addition to the associated in-depth knowledge, ability to understand and communicate with other experts was also seen as a central way to leverage expertise.

> may think we know what's possible and what isn't –we may not be able to question all the things we should be questioning."

> So, it has taken us some [time] to reach a common wavelength. Working as an assisting city official is a bit different from working as a researcher. So in a way [these team members'] responsibilities and things are a bit different."

Benefitting from one's own expertise required taking on an active role and openly sharing one's own views and thoughts in the team. In addition to a strong expertise role, the ability to keep one's own thinking open, and the will to also look at things through less familiar perspectives is emphasised when working with wicked problems. Wicked problems require collaboration that creates an understanding of the complex and ambiguous problem with no single correct answer. The ability to combine one's own views with less familiar perspectives and engaging in constructive conversation was essential to effective teamwork. In addition to the associated in-depth knowledge, ability to understand and communicate with other experts was also seen as a central way to leverage expertise.

Teams in which all members took part in the discussion and shared their own insights equally regularly invited others to join the discussion.

> When it comes to expertise, I myself don't value knowing a lot about something that highly. Instead, I value when someone knows a lot yet still takes all others into consideration and can take into account all other possibly relevant topics that they might personally not know that much about. [...] One plus one is always more [than two] when you can look at it together with others, from several perspectives."

Teams in which all members took part in the discussion and shared their own insights equally made sure that no one is left in the shadows in the discussion for a long time. These teams regularly invited others to join the discussion and built bridges between their own ideas and perspectives and those brought up by others. In situations in which one of the participants had been a listener for a long time, one of the other members made sure that the person who had been in the shadow would also be heard by explicitly asking for the said person's view of the discussion before moving on to the next topic.

Equally participating teams build interfaces between each other also through reflective speeches (vs. declaratory speeches) and by asking open-ended questions. What was characteristic of these teams was wording one's own thoughts for the others ("If I'd now reflect aloud how I understood that thought") and by softening one's own message ("This is just my idea, feel free to shoot it down"), which made it easy for the others to join. The importance of formulating one's own thoughts and justifying one's points of view is emphasised in multidisciplinary

collaboration in which people's background knowledge and assumptions vary and participants see their work through different lenses.

> Perhaps it's been like quite challenging because many [comments] have remained a little loose as it's been difficult to perceive why they've felt important to someone."

As stated in an interview, when working intensively with a complex problem, it is possible to forget that the other members of the team do not necessarily share the same background knowledge and views. Then, one can easily assume that the others understand the ideas underlying one's conclusion without unambiguous wording of the thoughts.

> I notice that I'm assuming that you all know what I know. And then I just jump into it [the conclusion]: since you know all of this, you will surely draw from all this information the same conclusion as I did – and I'm just saying that [the conclusion] aloud."

Formulating one's own thoughts and creating a verbal connection with the thoughts of others seems to be further emphasised in the context of virtual interaction where nonverbal communication is almost completely missing. Multidisciplinary teamwork and creative problem-solving that aims to create something completely new requires putting oneself on the line and requires encountering the other members as people – not only as providers of specific expertise or "service providers" for the team.

The importance of formulating one's own thoughts and justifying one's points of view is emphasised in multidisciplinary collaboration in which people's background knowledge and assumptions vary and participants see their work through different lenses. This is further emphasised in the context of virtual interaction.

Creating a shared understanding requires listening to others and compromise

The Sitra Lab teams pursued solutions to the challenges of urbanisation. To proceed from framing the problem towards a solution, the work of the teams requires creating a shared understanding as well as the ability to understand the ideas and views of other people who often think in a different way. Creating shared understanding of the identified problem requires consciously reserving time for understanding how each member understands the problem or clarifying what the team is pursuing. This was easily neglected by the teams and thereby made it more difficult to proceed with the problem.

> [Our team] should have had time to sit down together and think about what we're actually doing even earlier and more thoroughly... Maybe we didn't have that [shared perspective] on what we're actually doing. [...] Even though there were no conflicts, it was a little surprising that everyone has been emphasizing somewhat different things as essential here. So, perhaps in those teamwork situations there has been some [unclarity] – like 'oh, so this is our policy now'. We have talked about this within the team, and everyone has by now noticed that we should have reached more of a consensus early on."

What was characteristic of constructive interaction was that the discussion built on previous exchange of ideas, and the participants' insights were linked to the discussion on hand. This requires participants to avoid holding on so tightly to one's

Creating shared understanding of the identified problem requires consciously reserving time for understanding how each member understands the problem or clarifying what the team is pursuing.

own views that they would prevent the team's joint thinking from going forward. Even though the team identified that everyone has often strong views arising from the members' own expertise, the expertise of others was appreciated, and room was given for different views. Openness to other kinds of views and the will to compromise were seen as essential for creating a shared understanding, especially in the early phases of work when the problem was still taking shape.

> Those [team members'] competencies and ways of working started out as pretty different – everyone had the ambition and perhaps even a strong view there in the background. That you want to do things in this way, but can still also receive a somewhat different point of view from others. To my mind, that openness is quite important there, that the different backgrounds and different areas of expertise do not collide. So you don't end up in a tug of war about how to proceed from here. Instead, everyone has, despite their own strong views and experiences, the will to compromise. [...] It isn't just so that one says how it's going to go and the others follow."

Openness to other kinds of views and the will to compromise were seen as essential for creating a shared understanding, especially in the early phases of work when the problem was still taking shape.

Dialogical interaction was a characteristic feature of the interaction of some teams. Dialogical interaction involves actively listening to and aiming to understand others' views and building on them. In some teams, dialogical interaction could be momentarily seen in the collaboration, but it was not the predominant way of acting. As one of the participants put it: dialogue is a process that is built of the capability of all parties, and their willingness to consciously and actively listen and aim to understand the views of others. A few participants mentioned that discussions that repeatedly returned to topics that they thought had already been completed seemed frustrating.

> If someone cannot be dialogical and then the other party can, you can't build on that. If everyone masters it [dialogue], then something really great can emerge from it, as it is the sum of its parts. But if someone doesn't know how to do it, then [the communication] is easily just something angular and clumsy, it just doesn't – dialogue is a process in a way. It has to run – and everyone has to run it. Then if someone puts a stick in the middle of it and takes it forward, it loses this character. But now that everyone is at least in some way familiar with this way of working, then everyone hears, everyone is heard, and then we can go forward again, and again in the new phase everyone is heard."

> It felt to me like at some level the team several times returned to things I felt like, (--) that we have, like, already gone through these things earlier, that these do not promote this work. Then each time a kind of [need] emerged to look forward."

> Since teamwork is the sum of its parts – or preferably something more. And teamwork, if, OK, well first [there are]

those pieces, we all have our own agendas, they are bundled up. But making process means that everyone has to give up something from their own bundle at some point so that we can build it up. Because if you always go back to the bottom with that one part, the discussion is not a dialogue. You're not genuinely making progress. So, the next layer should, to my mind, always build on those previous pieces. Then when we have that new one, we build on that, not so that someone always pulls it down here to the basic level."

Sensitivity to how one's own idea or proposal is received by the team was mentioned as an essential part of constructive and constructive collaboration in solving complex problems. Participants saw identifying the time frames and working within their limits as important in both promoting problem-solving and respecting shared ownership. At times, this meant letting go of one's own idea and point of view so that the team could proceed with the concrete outcome in the required time.

The complexity of wicked problems requires structures that support work

During the training programme, the Sitra Lab teams wrestled with wicked problems that were complex and ambiguous with visions of the future still very unclear. These characteristics caused a lot of unclarity and uncertainty in working with the problems.

Even though the Sitra Lab process gave room for thinking more freely and approaching things in a different way, several teams noticed the need for organising and seek a structure for activities alongside more unrestrained thinking and activity.

Even though the Sitra Lab process gave room for thinking more freely and approaching things in a different way, several teams noticed the need for organising and seek a structure for activities alongside more unrestrained thinking and activity. Some of the observed teams formed structures that supported the progress of the work immediately in the initial phase, while some became aware of the need at some point of the process. The need was identified, and it was worded in the personal interviews and in some cases, also in team meetings. Yet, some of the teams never really discussed the matter with the team, and therefore could not implement practices that support the progress of the work. One of the participants mentioned in the final interview that they deemed it difficult to promote better organisation anymore in the phase in which the project had already been in progress for a long time. In the participant's team, the discussion about roles or better organisation of work was never had, as it was seen as criticism of the team's activities.

I think we should have organised ourselves better in the beginning and sought a little more structure. Or somehow [decide on] phases, so that it would have been just fine that we don't initially really know what we're doing and try to find out from Sitra, too, what they want. But that at some point we... would have gotten better organized."

Besides organisation, there was a desire early in the Sitra Lab process to have time for considering what the team's activities during the training programme aim to focus on and which things will be left to a later, post-Lab phase. Even though the creative problem-solving process is open-ended, and the problem in focus is defined along the way, it was deemed that some degree of determining the goal and direction would be necessary already in the initial phases of the

Teams added structure to their work in diverse ways, such as considering the agenda for the meetings, documentation of the meetings, assigning responsibility for facilitating the meetings, and long-term scheduling.

process. Lack of such determination caused frustration and uncertainty over what the team should focus their work on.

> **Well maybe at some point in the early phase we would have needed more discussion on all the perspectives or the different branches they had. And after we had discussed them, it might have been easier to choose what is what we can promote and do here and what is important, but just needs to be discarded from this Sitra Lab thing. So maybe we gave this just a bit too little attention."**

> **Now that I really begin to think about it, it seems like our setting of goals just wasn't right in the beginning. It seems that along the way nobody really knew where we were headed or where our target was. And that's why it has been so difficult. So it's not just the roles, but the definition of the entire work."**

Some of the teams systematically returned to the themes reviewed in the face-to-face days of the training programme and told the other team members about their personal insights and ideas that had emerged. Some of the teams did not have practices that would have supported the sharing of insights that influenced the development of one's own thinking to others. In addition to the teams aiming to jointly solve wicked problems, the Sitra Lab training programme aimed to support each participant's personal growth into a changemaker. Therefore, the need for openly discussing the personal goal for the training programme emerged.

> **It's how much they [the other team members] have thought they would invest in this. Is it – can you participate in this, listen and discuss, without creating anything except your personal development."**

It was significant that the teams did not always have practices for how to update information to their members who were absent from the training days, even when the problem definition and possible solution had been clarified during the training days.

Teams that managed to create a structure that supported their work were better kept up to date with the current and future matters, and did not unnecessarily return to matters that had already been dealt with in their discussions. Teams added structure to their work in diverse ways, such as considering the agenda for the meetings, documentation of the meetings, assigning responsibility for facilitating the meetings, and long-term scheduling. These turned out to be good ways of managing a project where areas remain vague for a long time, new information should be processed quickly, and all points of view are required for the matter to proceed. Work-supporting structures helped the team to focus on talking about the substance and better understand the topic. The discussion remained relevant when there was no uncertainty over what to focus on or what had happened since the previous meeting. One key practice that supported the teams' progress was the ability to focus the discussion back on the original topic at hand after free discussion:

One key practice that supported the teams' progress was the ability to focus the discussion back on the original topic at hand after free discussion.

The need for supporting the emergence of a collective memory is emphasised in virtual interaction where imprinting a memory was felt to be more difficult than when working physically in the same room.

> But we've had a laid-back, somewhat playful atmosphere – it hasn't been too serious. Still, I'd emphasise now [that the other team members] are such hardcore professionals in their own work in a way that our work is always guided, focusing on the fixed point where we're heading. So even if we discuss more broadly now and venture on side paths a little, it [our focus] still remains there.

> I sort of like it when things progress all the time. Even though there are a lot of [new ideas] in a good way, we get those new inputs from Sitra again, and just as it should, the double diamond bulges [the thinking diverges] and then at some point begins to narrow down. But even in this micro-group we should have someone who would every now and then narrow down our thinking – say 'hey, this is where we ended up last time, now we came to that and will go on from here' and then contacts specific people or parties for it [with whom it] has been agreed and so on."

In some of the observed teams, the "project manager" role stayed with a specific person and they retained this role throughout the process. Project management in the teams included structuring and documenting meetings, proposing milestones and communications, among other things. In some of the teams, the need for this kind of a role was recognised (in interviews), but the matter was never properly raised for discussion with the team. In a creative problem-solving process such as Sitra Lab, where the understanding of the problem at hand was created in close collaboration with other team members, individual team members did not find it reasonable to take a stronger role in heading the meetings and clarifying the objectives.

The need for supporting the emergence of a collective memory is emphasised in virtual interaction where imprinting a memory was felt to be more difficult than when working physically in the same room. Several participants mentioned that it is difficult for them to remember the previous discussions or workshops because all the meetings took place in the same context on a computer. This emphasises the need for creating shared memory imprints and structures that support working.

> Even though we've met several times on Teams, it somehow feels like [we] are going in circles around the same thing. That we're not really making progress with it. A part of it could be that we don't dig deeply enough into it, but I fell that it's also because [the members] don't remember where we left off last time. So if we'd meet [live], at least I'd remember better. You also get an impression to which you sort of link the memory."

Some of the teams used diverse artefacts that tied the team's attention to a shared target. This could be a crystallising sketch or visualisation of a process or diagram connected to the team's problem or solution, matters essential to the team's work listed on PowerPoint or an updated memo of the matters discussed at the meetings. Visualisations and artefacts shared with the team made it easier for the team to link and frame the discussion to the theme at hand.

It was noteworthy that if the team did not have a person responsible for heading the meetings and reminding what the teams had reviewed the last time, they readily went back to things that had already been discussed.

It was interesting that as a rule, the teams did not make use of the visualisations made during Sitra Lab or joint notes (often prepared on the Miro template). Often, the teams had difficulties finding the materials worked in the training days afterwards. Some of the teams documented the accumulated understanding on a shared working template throughout the training programme. It was noteworthy that if the team did not have a person responsible for heading the meetings and reminding what the teams had reviewed the last time, they readily went back to things that had already been discussed.

> "As we certainly come [to the team meetings] always from the middle of something else, we have a little bit of a habit of first taking one step backwards, in a way, and only then take two steps forward – and then the next time one step backwards again, and two forward. It has probably been a kind of characteristic feature of [our work]."

> "I believe that if our group had been forced to make the physical effort of actually meeting somewhere, we would have had to prepare a little better. [...] It's so easy to arrange these Teams meetings [where] you think that if you don't really have the energy – if we don't get it done today, we can schedule a new date and maybe then we will [get it done]. And the next time we start at the exact same point."

Giving room to both free and wandering discussion as well as to more formal work is necessary when working with complex problems.

If the work stagnated during the meeting, what took the thinking and doing forward was often a quick visualisation or sketch by a team member and sharing it with the others. Often, the visualisation had been prepared alongside the discussion without the others being aware of it. It seemed to be important to find a new grip surface for the discussion to get the team loose from the stagnant discussion. Also, varying the pacing of the work and activities was a way of getting the team's work pick pace. This was realised at the team meetings through intensive periods of independent work, for example, after which the teams shared their thoughts through their outputs with the others.

> "I felt I was a commentator and a sort of idea generator, but then we had someone who was both the chair and secretary, working through it in a way."

Many of the observed teams' members brought it up that the lack of time together was one of the major challenges in promoting the project, and on the other hand how longer joint working sessions often resulted in important insights and progress. Joint thinking, creation of understanding and free-flowing thinking were identified as important parts of the process. At the same time, the need for the work to be more determined and target-oriented was also identified. When the team shared a joint view and understanding of both types of working being necessary, room could more easily be given to both free and wandering discussion as well as to more formal work.

> It was really – was it the first long day when it felt like we're beginning to understand the shape of what all these things are connected to. I feel that in a way, after this moment we have almost only deepened and developed the insight or direction that emerged there. So probably that was the essential thing. And as soon as we've been together 2–3 hours – the few times we've done that – we've taken some kind of leap forward, every time."

> But we already agreed then that these Friday [team] meetings would be trouble-free activity, in a way, that the attitude [there] would be such that it's always nice to take a breather here and open up your mind and soul to this topic. Also because Sitra is in a way hoping that from us – that we would after all think in a new way and be changemakers, so that the Friday meeting would also be very informal. Now in the last moments [of our project] we've been talking that maybe we'd need to add another block [meeting] so we could include these slightly more formal practices. Like, OK, on Friday we discussed these matters, boom boom boom – sort of actually taking them forward in that other meeting. Still, the discussion could be nice and positive, but it could have a more forward-going style."

Conclusion – change is made in close collaboration between experts of different fields

This study is based on the close observing of the Sitra Lab training program, including the weekly observation of four teams over seven months. These multidisciplinary teams tackled wicked problems in their work developing nature-based solutions to the challenges of urbanisation.

The key findings of our work that emerged included the importance of the broad understanding of the problem, meaning of choices connected to the framing of the problem and identifying potential experiments and the ways in which the teams created a shared understanding and direction in order to find solutions. As our findings show, the complexity and ambiguousness of wicked problems required the teams to be able to combine experts in different fields into a single team and create a shared understanding of the observed problem, using the different points of view equally. On the other hand, a holistic approach to the problem and the openness of the creative problem-solving process necessitate structures that support work. Such structures help the teams to focus their activities and thereby proceed with solving the problem. A joint long-term objective that motivates the team's work lays out a direction for the team and a foundation for creating solutions together.

It is essential to recognize the more extensive objective to which the work at hand contributes its small but essential part.

Changemakers dare to think big and start small

Changemakers are usually discussed using pompous words: they are put on a pedestal and considered to be extraordinary in terms of their abilities and actions.

The Sitra Lab training programme shed light on a different kind of change work: the participating teams worked strongly together and created their solutions from a combination of different points of view and needs. Therefore, no need emerged for a clear figurehead or leader in the teams' work. This collaborative way of working was a planned part of the training programme, and it was found effective: our report repeatedly underscores that precisely such a working method offers the flexibility, comprehensive understanding and resilience required in connection with wicked problems.

A shared long-term objective forms the foundation for a change made together. Shared ownership and seeing how solving a small problem connects and contributes to a larger entity play a key role. Since wicked problems are complex and broad, solving them altogether and at once is impossible.

The remaining option is to approach them a smaller question at a time. Although all the Sitra Lab participants felt that the problem identified by their team was both important and worth their all efforts, some of the teams had difficulties perceiving the significance of the work carried out during Sitra Lab from the point of view of its more extensive societal meaning. This lack of a shared perspective caused suspicion in some teams regarding how their solution

The personal insights gained by the participants may have an essential impact on how the team's shared problem or the solution to it is seen or understood. It is important for the team members to discuss both these perspectives throughout the creative problem-solving process.

could promote the desired change. This suspicion, in turn, made it more difficult to proceed with the work at hand. It is essential to recognize the more extensive objective to which the work at hand contributes its small but essential part.

From the participants' perspective, there were two processes considered to be important running in parallel: the development of personal agency as changemakers and solving wicked problems. These both were clearly brought up already in the objectives of the programme – characterising the programme as a "training programme" is a good example of this. Even though attention was largely paid to the work of the teams and the solutions developed during the work, our study clearly demonstrated that these two processes were separate, as well as the need for acknowledging and supporting both these processes.

The two separate perspectives could also be seen in the varying personal objectives of the participants. In fact, the training programme should support the teams' open discussion of what each participant is pursuing in the training programme. For example, in some of the observed teams, there was no clarity among the members whether the others will settle for learning about making change at a personal level or they want to ambitiously aim at creating solutions to the problem the team is working on. It should also be noted that these two parallel processes influence each other. The personal insights gained by the participants may have an essential impact on how the team's shared problem or the solution to it is seen or understood. It is important for the team members to discuss both these perspectives throughout the creative problem-solving process.

No single person needs to have all the abilities of a changemaker. What is essential is how the individuals' abilities are used together with others – and also how the process of using them is supported.

Wicked problems require multidisciplinary collaboration that transcends organisational and sectoral boundaries. Change to social problems are never made alone, even if individuals and their actions have a significant impact on the change. As a result of this, no single person needs to have all the abilities of a changemaker. What is essential is how the individuals' abilities are used together with others – and also how the process of using them is supported. As one of the Sitra Lab participants said: "Change requires us – not me."

From identifying solution options to learning from experiments

Development by experimentation is one of the core themes of the Sitra Lab. Carrying out experiments was discussed throughout the process, and one of the aims of the training programme was to produce an experiment through which to build lessons for the subsequent phases.

Experimentation is based on learning. The purpose of experiments during innovation efforts is to create understanding and information about the challenge at hand. Experiments are carried out to obtain information about whether it is worthwhile to continue with the idea of the original solution and what are the next development steps in this case. Experiments also force

"Change requires us — not me."

one to specify the target group and listen to their views.

The Sitra Lab participants' experiences showed that development by experimentation requires clear-cut structures and practical support to succeed. Experiments must be supported with structures that encourage experimenting at the earliest phase possible. The experiments of the solutions developed in the Sitra Lab training programme made up a separate phase at the end of the training programme. The training programme aimed to guide the mindset towards experimenting with the ideas already during the preceding development. Carrying out actual experimentation already in an earlier phase would also make this more concrete through action.

During the late phases of the programme, the teams wrote an experiment plan in which the teams were to describe the experiment and what was investigated with the experiment. However, planning the experiment could only be started at a relatively late phase – in part slowed down by the remote way of working – and several teams ended up piloting or further developing their solution of their choice by engaging stakeholders instead of an experiment aiming at learning.

Even though the engagement of the identified target groups is an important part of creative problem-solving, engagement does not automatically expose an unfinished idea to immediate feedback. In carrying out experiments, the courage to show work in process to others and receive direct feedback on the idea is key. Experimental development requires openness to different development directions and an open mind not too fixed on the solution chosen at an early phase. As mentioned earlier, the role of experience is emphasised in learning a new way of working. Because of this, it is important that processes like Sitra Lab help and guide the participants through carrying out experiments and learning from them.

In carrying out experiments, the courage to show work in process to others and receive direct feedback on the idea is key. It is important that processes like Sitra Lab help and guide the participants through carrying out experiments and learning from them.

Introducing experiments only in the final stages of the programme left the teams' experiments separate from their own work. Even though this choice was justified (both from the point of view of the uncertainty caused by the pandemic and the teams' peace of mind), its impact was that the solution did not encounter its planned application environment until important choices had already been made. In this case, the development steps following an experiment are by necessity based on choices made *before* the experiment, and not on the learning and understanding gained from the experiment. This is because time and effort have already been invested in the *chosen* solutions, and keeping them less seems less risky (and cumbersome) than experimenting with a new uncertain solution.

Because many teams only carried out the experiment at the very end of the process, the benefit of the experiments as tools for increasing the participants' understanding and helping them learn about the idea could not be exploited to full effect. However, experimental development is not one-time by nature. A single experiment can only rarely – if ever – provide enough information for all the questions important to the solution. Due to the complexity of wicked problems, a solution improved based on the first experiment is hardly finished; as a rule, developing an extensive solution requires recurring experiments. To be able to practise and learn

from the experiment and experimental development during the training programme, the threshold of the first experiment should be crossed as soon as possible and with little effort. In supporting the experimental development, it is essential that the structure and resources of the training programme guide towards iterative experimenting and learning from them throughout the programme. This means, among other things, carrying out experiments at a sufficiently early phase so that the lessons learned from the experiment can be used in the further development of the solution during the training programme.

The different levels of complexity require an organised approach

The organisation of project work and support for teamwork require special attention in responding to wicked problems in which there are several simultaneous levels of complexity. The teams that took part in Sitra Lab worked with wicked problems that involved a lot of uncertainties, for example due to the vague views of the future that are typical of wicked problems. In addition to this, the Sitra Lab way of working in which problems are approached holistically and progress is not linear was new to many of the participants. Organised and more systematic approach has not been necessarily associated with more open and creative problem-solving. The participants brought up their will to collaborate freely so that "everyone is shaping a shared dough."

Organized and more systematic approach to the project work is not necessarily associated with more open and creative problem-solving.

However, the need for organising the project work and creating practices that support the teamwork was identified already at an early phase of the Sitra Lab process. Some of the participants brought up that they would have wished support from Sitra for the organisation of work and perceiving the team roles. It could be seen in the activities of some of the teams that delays in agreeing on team roles or working methods meant that the practices that support the progress of work easily remained unclear throughout the working. The unorganised nature was easily seen as the team's activities stagnated, which seemed to affect the motivation of some of the team members.

To succeed, joint development requires shared concepts and understanding of others' points of view. Time and open discussion are required from the teams for these to form. Challenges with understanding the perspectives of other team members caused challenges with the progress of the work. In interviews, participants often returned to insights that they had gained alongside the work or shared by others that had impacts on their notions of the team's shared problem at hand. Such insights emerged both independently in the individuals' own thinking and in discussions with others. The insights significantly guide the work of the team, which is why sharing them within the team is essential. It is important to acknowledge that sharing and creating a shared understanding require systematically taking the time and confidence in everyone being willing to understand different views within the team.

Moving between divergent and convergent thinking is emphasised in creative problem-solving. Both are needed to create a broad understanding on the one hand and reaching a more precise framing of the problem and potential solution on the other. These two ways of thinking require

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different attitudes and acknowledging the phase of the process where it is time for criticism-free thinking and which phase is the most fertile for constructive criticism.

We also noticed that excessive emphasis on convergent thinking leads to not identifying the possible solution directions and not investigating them enough, resulting in easily staying with the known and most obvious solution options. Similarly, excessive emphasis on divergent thinking easily creates challenges in framing the problem or solution, thereby preventing the team from proceeding with solving the problem. From the perspective of supporting the creative problem-solving process, the teams can be in very different phases: some of the teams might already be headed for experiments while others are still considering the framing of the identified problem. Simultaneously supporting these processes that are at different stages causes challenges to training programmes that need to follow a certain order in terms of their content. The experiences of the Sitra Lab teams also show how important correct timing is for inputs from outside the team: for example, questions that reopen the possible solutions can unnecessarily disperse the focus of the team's activities when the team is already preparing an experiment focused on their solution.

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Because the final objective often only gradually takes shape when solving wicked problems, even small, fixed points along the way that make progress clearer support the team's activities. Intermediate goals that pace the work, associated with either concrete outputs (such as work plans, presentations concerning the specification of the project or its partial outputs) or the themes reviewed (such as engagement of stakeholders, learning from experiments) could have helped the teams in achieving progress in their work. This could have been supported by small experiments taking place earlier, as mentioned in the previous section. On the other hand, structures that make activities clearer were longed for at different levels. For example, the participants wished for a better overview of the Sitra Lab process and its goal, as well as clarifying the interim objectives for different sections of the training programme.

Work for change needs to be supported in the long term

Tackling wicked problems challenged participants who were used to work with more defined problems and approaching them in a straightforward manner, and required that they learn new ways of working. Giving practical experience was, after all, one of the most important goals of Sitra Lab, and it succeeded quite well. Participation in the Sitra Lab training program was an intensive work process from which the new mindset of approaching complex problems remained at the top of the participants' minds. Through the process that was even frustrating at times, the most important element of making change – a change in mindset – was made concrete. The participants brought up how they felt that the Sitra Lab training

An important question is how parties like Sitra Lab could support the agency as changemakers in the longer term, also after the end of the training programme.

programme was a facilitator of a new kind of doing and way of thinking.

Participants stated that the training programme had given them room for thinking about how things and problems should be approached and what should be done instead of pursuing a pre-defined objective from the very beginning. Participants also pondered how they could make space for a different way of thinking and questioning in their own work. It is interesting how, and whether, individual programmes can change people's ways of working in the context of their day-to-day lives. Repeating the new way of operating and working with new people as the only experienced one requires expertise and courage, and one-time participation in a training programme, even an intensive one, does not necessarily embed the new operating methods deep enough to promote them in one's own activities.

The successes of Sitra Lab show clearly the importance of experientialism in creative problem-solving. Steering attention to learning individual tools rarely leads to doing things in a new way at the fundamental level. Also, the Sitra Lab participants did not bring up individual tools in the final interviews, and the teams did not return to the tools introduced during the training programme at a later phase. An important question is how parties like Sitra Lab could support the agency as changemakers in the longer term, also after the end of the training programme.

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