Educating for the Unforeseen: using educational science and innovation to prepare managers and employees to work with unforeseen events.

1. Excellence

1.1 State of the art, knowledge needs and project objectives

This project has the overall objective of developing new theoretical insights and practical methods which can be used to develop the competences and skills necessary to meet unforeseen events. To achieve this goal, we will combine theories from educational science with concepts developed in recent research on innovation and in theories on anticipation. The main aim is to develop new theoretical concepts, but we will also take the first step towards developing practical ways of using these concepts in the workplace and we will do this in dialogue with businesses and public sector organisations in Norway.

Rapid societal changes and unforeseen crises, such as the recent COVID-19 pandemic can have detrimental effects on social and economic systems and their long-term consequences remain largely uncertain. How to best tackle disruption is thus a key priority for governments and business managers around the world. Competence in handling uncertainty and unforeseen events has gradually become a clearer social and political task, both individually and in collaboration between different organisations[1]. The message is also rooted in the 17 UN Sustainable Development Goals (SDGs). In its recent Science, Technology and Innovation Outlook 2021, the OECD highlights the need for policy learning and development helping us transition to more sustainable, equitable and resilient societies. This requires targeted, well designed and responsible measures, the OECD says, as well as flexible and adaptable systems that are able to address complex challenges. There is a growing understanding that there is a need for skills that help organisations address such challenges through creative co-learning and co-creation of knowledge across institutional, political, disciplinary and cultural boundaries.

In acknowledging this need for competence, we must in turn accept the need for new learning in the workforce to provide new competence adapted to the new challenges. Learning and interaction during crises, with great risk and unpredictability, are examples of such areas of expertise. This creates a demand for the articulation and design new competence structures, of training goals, training plans and their management. Some research has been done, and several projects are underway related to civil-military cooperation[2]. However, these projects emphasize organisation between agencies and sectors with daily emergency preparedness functions, and to a lesser extent focus on specific competence development and education activities in the business and the public sector. In addition, there is little theoretical development on which knowledge structures (competence areas) at the individual level should be developed to handle unforeseen events (Torgersen, 2015; 2018). There are also shortcomings in specific research designs and instruments for data collection when examining competence for the unforeseen (Herberg et al. 2019), and not least working methods for pedagogical practice for developing such competence. This legitimizes our project, which includes both theory development and research method development and has implications particularly for adult education and educational facilitation and learning methods.

Challenges in developing competence to meet the unforeseen

A recent project on digitalisation in Norway (Olsen et al. 2019) found that following existing rules and norms in the workplace constituted a potential challenge to radical change. This attention to rules and standardised processes permeated much of the public sector and managers were typically promoted based on their ability to follow existing practices and adhere to familiar standards. However, there was an awareness among managers of this challenge and they expressed a need to prepare for new technologies, to think outside the box, to visualise different futures and to realise that the solution to tomorrow's problems might not be found within the existing departmental boundaries. Competence development, at least in the public sector, has typically been focused on delivering results and studies have observed that there is a high focus on quality, reliability and predictability which are more highly valued than novelty (OECD 2017). Indeed in their identification of barriers to public sector innovation, the OECD raised concerns that risk aversion was

[1] White paper No. 5 (2020–2021) - *Samfunnssikkerhet i en usikker verden (Civil protection in an unsecure world)*.
[2] White paper. No.5, (2020-2021): 151-153

common practice and that “silos”, hierarchical structures and a lack of diversity may have become embodied in rules and regulations" (ibid :11) Management by objectives, a practice introduced to achieve more flexibility and adaptability in the public sector, has often led to an increased focus on delivering based on yesterday's challenges, as opposed the unforeseen challenges of tomorrow. The issue is not only the rules and regulations, but also "the behaviour they generate"(ibid:32). It has been suggested that this behaviour may limit the ability to create tailor-made solutions to complex issues (de Jong, 2014) and that human resource managers should support the development of technical skills, creativity and associative thinking and of new processes such as prototyping, co-creation and new ways of translating uncertainty into known risks (ibid:12).

In spite of all this interest in the related themes of *risk, the unforeseen, the unpredictable* and *societal challenges*, there is still a need for a better understanding of what organisations need to know in order to tackle the unforeseen, there is a need for new practical pedagogical methods to help organisations develop the necessary knowledge and skills needed to prepare them for new situations in the future. In order to develop the necessary theoretical concepts, we intend to draw upon three fields of research which, combined, may provide valuable insights for developing new theory and methods. These insights will also provide us with a starting point to help managers and employees to improve their capabilities and better prepare them for unforeseen situations. In the next section we present key concepts and research findings on the unforeseen in a) educational research, including pedagogy for the Unforeseen b); Innovation studies, and c) Anticipation theories.

A) Educational research on the unforeseen

We take as our starting point, the basic research done in Norway by Torgersen et al. published in 2015 and 2018. The 2010-2015 project explored the nuances between the unforeseen, the unexpected, the accidental, the improbable, the unpredictable and the surprising. The researchers suggested that traditional educational theory assumes a certain amount of predictability, causality and linearity, which is not necessarily the case with educational issues related to unforeseen situations. Teaching for the unforeseen, means directing teaching towards an unknown aim, or a moving target and the whole situation for teachers and learners is characterised by fear or uncertainty, which must also be addressed.

The researchers have examined planning for the unforeseen, and recognising early signs, they have also looked at ways of stimulating spontaneity and improvisation. They also consider indirect learning and lifelong learning as potential ways of preparing people for the unforeseen. The research is cross-disciplinary, but mainly grounded in pedagogy, psychology, organisational learning and leadership theory and practice. The cases involved in earlier research are varied, and include military and crises managers, rescue services, volunteer organisations, public services, schools, higher education institutions and politicians. The topics have also encompassed climate challenges, risk communication, mental health and readiness in everyday life. Conclusions from the Norwegian research group have so far shown that interaction is essential in preparing for handling unforeseen situations. This kind of interaction involves more than mere cooperation, rather requiring trust and relational competence in order to aim for higher ambitions in interactions. The projects have provided some suggestions on how to prepare for unforeseen situations through training and education, adjusted organisation and leadership, as well as optimal use of experience from real-life situations. For example, a didactic planning model for training in the unforeseen has been developed (Torgersen & Saeverot, 2015: 330), it complements learning goals with generic competence areas, like self-efficacy, social support, improvisation, and co-creating. New studies (Torgersen, 2018) indicate that co-creating is one of the most distinct predictors for efficient handling unforeseen events. However, the “co-creating” concept is based on a high level of relational capabilities, different from the traditional understanding of «cooperation», and consists of something more than communication and coordination. *Co-creating in unpredictable conditions,* emphasises other factors such as educational, organisational and operational structures. The suggested pedagogical approach is *indirect* (Saeverot, 2013; Saeverot & Torgersen 2020), and use of «invisible methods», implying a minimum use of defined blueprint solutions, and a conscious use of unclear learning content. This model will also form a basis for further development of pedagogical practice in the present project, as well as further development of the model based on new findings.

The scientific challenge is both theoretical and practical. Traditional models and ways of planning how to learn (e.g., didactic relationship thinking) and formation models (eg. encyclopaedic) are not sufficient

to handle this kind of problems. Existing didactic models presuppose clear learning goals and an inner causal interaction between factors like aims and content, which cannot be defined in advance concerning unforeseen events. Resilience models are based on the frequency of former occurred events. Models of organisational learning have a more general perspective on competence and less direct intervening approach to the learning process. New or revised models are needed based on the nature of the unforeseen.

In spite of this recent work on the unforeseen, there is still a long way to go before we have good methods for designing and delivering education for the unforeseen. The current challenge is how to learn about something that is yet not known and how can teachers or trainers teach what is not known? Traditional methods for learning and training are not sufficient when the theme is unforeseen events and today the need to develop a pedagogy for situations that are unpredictable and not developing according to plan, is more pressing than ever.

B) Innovation studies and how they address the unforeseen

Unlike educational theories, studies of innovation have a much more chequered past with input from economists, business researchers and industrial dynamics. Joseph Schumpeter is perhaps the best known to those outside the field, he developed the concept of "creative destruction" whereby change is a continuous process and indeed a driver of business development. Studies of innovation frequently focus on interaction between different groups and individuals. This might be communication between different actors at a national level but can also include studies of how for example health professionals communicate with engineers to produce new technologies. Networks or "know who" (Lundvall 2016) are central to innovation studies as is interdisciplinary collaboration (Frodemann & Mitcham 2007) and there is an emphasis on learning from trial and error (Harborn & Hendry 2006).

Studies of innovation were traditionally focused on technological innovation, but more recent studies are typically organised in terms of product, service organisational innovation. A recent concept developed in innovation studies is the concept of transitions, which understands changes over time such as transitions from petrol driven vehicles to electrical forms of transport. There are many unknown factors in the early stages of a long-term transition and new technologies do not always function as planned and societies do adapt as expected. While the importance of learning is underscored by many sustainability transition scholars, there is an understanding that a deeper conceptualisation, discussion and elaboration of the learning processes associated with transitions is required (van Mierlo & Beers, 2020). Given the complexity and uncertainty associated with sustainability transitions it is argued that multiple types of learning processes are likely to take place in transition processes. However, research has shown that several established learning traditions poorly address the complexity of transitions. Moreover, that well-established research fields related to learning are broadly ignored or loosely applied in transitions studies (van Mierlo & Beers 2020).

Another theoretical concept in innovation studies is that of employee-driven innovation. This looks more closely at how individuals at work can contribute to innovation; how they need to interact, the kind of working environments that are conducive to the sharing and developing of novelty etc. (Darsø 2012; Høyrup 2012). Although not directed at the unforeseen, this concept is interesting because it looks at what gets employees to think differently about how they work and identify the potential for change and development.

An important aspect of innovation is that knowledge may come from multiple sources, or as the result of different activities such as research, problem-solving at work or it may arise from working with new partners and in new ways. Innovation studies is not a homogenous field, with methods just waiting to be used to help with the unforeseen. However, we see a potential to gain new insights by studying research on innovation processes and analysing their potential for expanding our repertoire of methods for dealing with the unforeseen. We therefore intend to explore ways in which concepts and insights from learning, as developed in the educational research on the unforeseen, relate to studies of innovation in its various forms and how it might improve theories of innovation. In this way we hope to narrow an identified research gap between theories on learning and innovation. The project, hence, brings together learning scholars and scholars in innovation studies with an interest in innovation, including sustainability transitions for mutual inspiration and knowledge building.

C) Anticipation and Futures Literacy and their relevance for the unforeseen

Another research field of relevance to this project is anticipation. This discipline is still in a pre-paradigmatic phase and is therefore very diverse. It has grown out of foresight studies and practices, but unlike some types

of future work (which aim at predicting the future), anticipation is aimed at revealing existing preconceptions of the future. We have a tendency to "colonize" the future by developing narratives about the future which are more or less a continuation of the present. For instance: The traditional policy narratives and business strategies suggest activities which should make the world of the future a better and more advanced version of the present. This has made it very hard to ascertain possible negative consequences of future pathways, as found – for instance – in climate change.

We would like to make use of thinking associated with Futures Literacy – an approach developed by a UNESCO network of researchers led by Dr. Riel Miller (Miller 2019) to enrich our discussions of learning and innovation. This tradition aims at making people more capable of making use of the future in their work and planning, for instance by making them aware of their own preconceptions and prejudices, fears and hopes. This "reframing" and self-reflection make it easier for them to think outside the given boxes and imagine unexpected futures and the "unseen". Again: This is not about predicting the future. It is about using the future to learn about the present and identify challenges and opportunities that may affect us in the future. The anticipation tradition has also a strong focus on the inclusion of a wide variety of people in relevant learning processes, which will be relevant to our own discussions of creative co-learning and co-creation. Our research team has members who are also active in the UNESCO network.

There is a need for more research that focuses on the particular, detail-oriented, competence related to dealing with unforeseen events, and we suggest that by incorporating innovative thinking and innovative processes, we will be able to advance our knowledge in order to develop high quality didactic tests of learning design for pedagogical practice, a prerequisite to develop learning in practice. With this project we intend to expand and invigorate existing theoretical concepts and methods in both innovation studies and educational research on the unforeseen. Our project will make a major contribution to meeting the needs and research gaps identified in both fields and will do this in a novel and interdisciplinary way.

1.2 Research questions and hypotheses, theoretical approach and methodology

This project will use this combination of theoretical perspectives to develop an overview of the knowledge and skills necessary for organisations who want to be prepared for the unforeseen. We will then study the current state of knowledge in selected organisations and use this as a starting point for a dialogue with firms and public sector organisations to find appropriate learning methods and test them in selected workplaces. This should result in new theoretical perspectives and new practical methods for knowledge development in organisations.

The main research questions for the project are as follows:

1. What kind of competences do employees have for handling unforeseen events and for developing innovative processes at work?
2. What is the connection between competence for the unforeseen and competence for developing innovative processes?
3. How can we develop and combine competences for the unforeseen and innovation with respect to the needs of individual organisations and society?

In order to answer to these questions, we have organised the project in five interrelated work packages. The fifth work package will be responsible for coordination, communication and synthesis of research findings.

The relation between competences for innovation and education for the unforeseen (WP1)

Our starting point will be to review research within educational science on the unforeseen and we will endeavour to find concepts within innovation research which might supplement the educational research and assist us in taking this educational research a step closer to practical application. Main research questions to be answered in this workpackage are:

1. Can research on innovation supplement research on educating for the unforeseen?
2. To what extent do insights from education for the unforeseen appear to be relevant for specific timeframes and related phases in a sustainability transition?
3. What suggestions do theories from education for the unforeseen, theories of innovation and anticipation provide to support for stimulating learning at work and in transition processes?

Task 1: Develop a search strategy for finding relevant research literature from education and innovation studies and a model for classifying and analysing relevant findings.
Task 2: Identify and analyse research literature with emphasis on pedagogical practice and facilitation of competence development for unforeseen events.

Assessing the preparedness for the unforeseen of Norwegian organisations (WP2)
In this work package we will carry out a survey among managers and employees in our chosen organisations. This survey will build upon earlier work carried out by USN (UN-METH project) and work carried out by NIFU in recent projects for assessing learning at work. Activities within this work package will use established methods and tools (UN-METH and CSQ, VIA-IS, OBSCIF), which will be adapted and further developed, based on the findings of WP 1. The main research questions to be answered are:

1. How can the competences for the unforeseen be mapped, observed and assessed?
2. Which character strengths are the most important when it comes to coping with unforeseen events?
3. Which individual factors affect the ability to handle unforeseen events?
4. What is the level of preparedness for the unforeseen in Norwegian organisations?
5. What effect has the education (intervention) had?

Task 1: Further develop and adapt existing methods (UN-METH, CSQ, OBSCIF), also based on WP 1.
Task 2: Collect data through the VIA-IS and UN-METH tool from a selection of relevant organisations that need a high level of preparedness.
Task 3: Data analysis (mixed methods), and relation / sample versus results in relation to the research goals
Task 4: Analyse feedback from WP4.

Assessing competence and understanding of the unforeseen at work (WP3)
This WP will attempt to dig a bit deeper than WP 2 and will select a few organisations in the public and private sector with 5 in-depth case studies. We will examine the following themes:

1. How employers and employees interpret the concept of the unforeseen
2. How they work with competence development
3. What kind of learning environments exist in the different workplaces?
4. What opportunities are there for formal and informal learning on the unforeseen.

We will use qualitative methods, such as interviews and workshops with managers and employees and studies of available documentation. We will use the framework developed in the UN-Meth project as a starting point for developing our interview guide. We have also planned an interview with Nonaka and will draw upon his experience in planning this work package.
Task 1 - Selection of relevant cases and development of interview guides
Task 2- Interview with Nonaka
Task 3- Organise Futures literacy laboratories with participants from selected case studies (at least three)
Task 4 - Data gathering and analysis

Co-creating and co-learning to improve competence on the unforeseen at work (WP4)
The work will be based on dialogue and engagement of employees (based on a selection of those who participated in surveys or case studies) in discussions, workshops and practical exercises. The themes to be discussed with managers will be based upon our analysis of findings in WP2 and WP3, which will provide information on the competence requirements and the learning environments among survey respondents and interviewees. We will use the concepts suggested from the literature study in WP1 and, in collaboration with employers, suggest learning processes by building upon principles of educational science as well as experiences from workplace learning. This work package will engage organisations in discussions on the importance of learning and understanding the unforeseen at work. The choice of themes for these discussions will be finalised after the completion of WP2 and WP 3. Concepts arising in WP1 will be considered, some examples might be learning by experimenting, learning in networks and interdisciplinary learning. Much of the learning studied in innovation research is informal and this must be approached in a different way from formal learning. It may be necessary to find ways of integrating new tasks into working processes, which will result in a better understanding of the unforeseen, or perhaps by engineering learning opportunities in daily work. It might be more appropriate to hold seminars or to try to integrate exercises on

the unforeseen into ongoing development projects. It may also be necessary to consider how to motivate employees to consider the unforeseen. Main research questions:

1. How can we educate employers and employees, in the workplace, to help them better tackle the unforeseen?
2. Can future literacy labs contribute to developing skills to deal with the unforeseen?

Task 1 – Selection of learning content from WP2 and WP3
Task 2 – Establish dialogue with Norwegian work environments on learning about the unforeseen
Task 3 – Propose new learning processes tailored to our business and public sector participants
Task 4 – Trial new methods and learning processes where applicable

Theoretical approaches and methodology

In order to answer our research questions, the project will apply an **interdisciplinary approach**, combining insights from recent research on educating for the unforeseen with insights from research on innovation processes. The project will also combine a mixed method approach combining qualitative and quantitative research tools.

The method to be used in WP 1 will be based upon a **literature review** which will consist of a scoping exercise and a method for study selection and data extraction, thematic analysis (TA) (Braun & Clarke, 2006) and Press-methodology (McGowan et al., 2016*).* We aim to use a multistage approach to select relevant literature studies for the review. Studies have to meet specific inclusion and exclusion criteria. Moreover, we will develop a coding scheme to extract data from the selected studies (based upon Press or/and TA-methodology).

In WP 2 the method tools UN-METH (**Unforeseen Methodology)** will be used as a starting point and will be further developed**.** The original method consists of a mixed method battery to assess an organisation's preparedness for the unforeseen (Torgersen, 2018; Herberg et al., 2015; 2018). The **questionnaire** consists of a 100-item measuring instrument for mapping competence level of readiness in different organisations (12 competence areas), supported with a Norwegian translation of the Perceived Social Support (PSS) Scale by Procidano and Heller (1983). In addition, the battery consists of **semi-structured interviews**, observations and CAF-analysis of the organisations strategic competence and training plans (CAF - Competence assurance framework). The method tools Character Strength Questionnaire (Boe 2016; Boe & Bang 2017) and Observation of Character Strengths in the Field (Bang, Boe, Nilsen, & Eilertsen, 2015; 2017) have been developed in a military context, but have a clear relevance for preparedness in organisations being exposed to the unforeseen. The method tool "Values in action - inventory of strengths "(VIA-IS) is a recognized and valid scientific measuring instrument for measuring individual character strengths and virtues (Peterson & Seligman, 2004). VIA-IS measures the relative strength of 24 character strengths in an individual, and scientific studies have confirmed the validity of the measuring instrument.

Case studies will be used in WP3 to provide us with a better understanding of how organisations interpret the concept of the unforeseen as well as more detailed understanding of how they are working to prepare employees for working in new ways and how to deal with not only moving targets, but in some cases unknown targets. We will select five cases including organisations in the public and the private sector. These cases may not be representative but will be chosen to study the particular challenges of the unforeseen in different business sectors. The methods used to gather data in WP3 and WP4 will be **semi-structured, in-depth, individual interviews** and **group interviews**. In order to develop relevant learning programs, we need to get an insider's view of the unforeseen. It is quite time consuming and requires a high level of trust between researchers and interviewees. In the case studies we will include future oriented workshops (**Futures Literacy Labs- FLL**) anchored in the anticipation and Futures Literacy tradition (Miller, 2017). FLL's are learning by doing/action-research workshops with the objective of enabling participants to reveal, reframe and rethink the assumptions they use to imagine different futures. The aim is to explore different stories about the future, and use these stories to reflect on our preconceptions, social, economic, environmental and technological drivers, our own potential in the meeting with important challenges and the unforeseen. The participants in the case studies and the FLLs will be recruited with the support from the Norwegian Employers' Association Spekter and from other public sector organisations. Spekter represents a diversity of companies with approximately 200.000 employees. The member companies are large public sector and private companies within the health sector, culture, transport and infrastructure. By using mixed methods (**surveys, interviews and FLLs**) we will be able to study the current conditions in a wide number of

organisations, while the interviews will provide narrative examples and hopefully more explanatory information from a variety of learning environments. The reason we include in-depth interviews is to gain an understanding of how Norwegian workers actually view the unforeseen, what does it mean for them? Do they understand it in the same way as in military environments?

Risk management

A risk related to gathering data from organisations is that research activities are not always given a high priority. In our experience it is an advantage to work with employer or employee organisations, who can act as a bridge builder to interviewees and respondents in the workforce. Our cooperation with Spekter and other public sector organisations will secure us access to a large pool of employees whom we will invite to participate in our research. This will give us new rich data and will make it possible for us to trial learning programs in a variety of different organisations.

Another risk is related to communication of concepts to non-research actors. This is one of the reasons we have included Per Koch who is the editor of a Nordic publication on innovation and research and was previously the director of Innovation Norway. He will be well positioned to improve communications and reduce assumptions and misunderstandings.

A particular challenge of this project is getting researchers from different fields to work together in a productive way. Dorothy Sutherland Olsen has considerable experience with this both as a project manager in the private sector and in her research studies on interdisciplinary collaboration. We have allocated extra time to collaborative work in WP1 and will include interdisciplinary writing workshops to support this process throughout the project. All project participants are motivated to overcome disciplinary barriers in our work.

With regard to research ethics, all survey and interview candidates will be informed that participation is voluntary and that findings will be anonymised. They will be informed as to how data will be stored and used in the project. The project will apply to NSD for approval of methods and compliance with regulation on use of personal data and will follow their guidelines.

1.3 Novelty and ambition

The main novelty of this project is that it will draw upon theoretical concepts from relatively unrelated fields of research - primarily educational science, innovation studies, and anticipation – to develop a better understanding of the competence and capabilities needed for people and organisations to address unforeseen problems, societal challenges and an uncertain future. The Covid 19 crisis tells us that it can be extremely hard for companies, organisations and communities to handle challenges for which they are unprepared (even if the history of pandemics had shown us all that such a scenario was inevitable). This becomes even more important when we have to build the capacity to tackle problems that we have not been able to predict (as in the recent totalitarian attacks on democracy). This project will make use of existing research and thinking in order to understand the cultural and mental inertia found in many people and organisations, and identify ways of making them and the systems they are part of more creative and future oriented.

Due to the societal relevance of our research theme, we have ambitions to take this work beyond the obvious academic contributions and test out the practical application of some of our theoretical concepts. Within the educational research on the unforeseen, concepts of innovation are new and will contribute to the development and testing of existing concepts. By establishing a close link to the Military Academy of Japan, via a member of our reference group, we are inviting non-European viewpoints into the project and opening the door to the long history Japan has of studying knowledge creation and learning in the workplace (e.g. Ikujiro Nonaka). By using research carried out in military environments (in Norway and Japan), to study civilian working environments, we have a novel starting point for improving competence for adult workers. By bringing together researchers from educational science and innovation studies we have created a truly interdisciplinary team who span over a broad range of theoretical perspectives and who have experience of studying learning or innovation at the level of the individual, the team, the firm, the industrial sector or the nation. This combination is challenging, but will give us a unique possibility to link previously unlinked theoretical perspectives and empirical studies.

2. Impact

2.1 Potential for academic impact of the research project

We intend to make a significant contribution, in volume an in depth, to research on educating for the unforeseen. The findings will enrich and expand earlier research on preparing for the unforeseen improving and verifying methods. Our work will add to the quality and consistence of earlier research on this theme and make new theoretical concepts available to the field of innovation research. One important impact will be to break down the walls of some important research silos and through transdisciplinary research discuss the similarities and dissimilarities in the way the chosen research traditions understand and address the need for learning and change. We believe these traditions can enrich each other. The team aims at making the findings known among researchers in this field, partly through publication in academic journals and presentations in scientific conferences, but also by engaging relevant networks of researchers and policy makers (as in the TIPC and UNESCO network of Futures Literacy Chairs). We also plan to present some of our findings at a small seminar in Japan, thus making our European research more easily available in Asia. This project will result in a minimum of five scientific publications and several non-academic publications. Findings will be presented at three or more academic conferences and at stakeholder workshops and seminars.

2.2 Potential for societal impact of the research project

Cultural, mental and institutional lock-in make it hard for people, companies and organisations to free themselves from the present and the past and imagine and prepare for the unexpected. Yet, at this point in history, many actors have become aware of the need for new approaches. They see that the existing systems are no longer capable of solving the new and pressing challenges we are facing, both nationally and globally. This realisation is reflected in the discussions about global challenges, development goals, missions and political and cultural polarization. This research will be of particular interest to SDG 16, on the need to "promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels", but all the goals require a capacity to handle the unforeseen.

This project focuses on creativity, learning and the ability to tackle change in selected companies and institutions, but we will also learn a lot about how people and organisations understand the unexpected in general. This knowledge can be used to identify drivers and barriers to challenge oriented transformation, also on the macro level. On the basis of this research, we will therefore make observations on how these findings can enrich the development of responsible, sustainable and transformative innovation policies in all areas of society. Since this research is about the ability to face unexpected challenges, the findings will be of relevance to all areas where people meet the unexpected – and that is *all* parts of society. This means that much of what we discover will be of relevance to all the 17 of the UN Sustainable Development Goals. The PhD project will address this more specifically. Moreover, the findings will potentially contribute to industrial renewal, civil society and the development of our democracies, innovation in the public sector as well as a recalibration of the educational system, enabling it to develop the skills society needs when facing an uncertain future.

2.3 Measures for communication and exploitation

We have planned for a work package dedicated to project coordination, synthesising project results and internal and external communication. The project organisation is set up to ensure information exchange and synergies between all the WPs and shared publications. As our main aim is to move the boundaries of research in our chosen fields, we will prioritise communication with academics and other researchers. We will produce scientific publications (at least 5), and present findings at academic conferences (at least 3). We will also arrange a seminar with The Japanese Military Academy and with other relevant research groups, such as those interested in themes like societal transformation, the use of the future and co-learning and co-creation. As all project partners have communication professionals in-house, we will involve them in the dissemination work and make use of their established communication channels, such as websites and social media. A project website will be established. In addition to meetings, project participants will communicate as needed and information will be shared using Microsoft Teams as an internal communication platform. All

persons involved in the project will be encouraged to reach out and participate in the media, when relevant topics are on the news agenda.
On the stakeholder/user side the target audiences will be people and organisations working on social change, global challenges and the need to face the unexpected. This includes, but is not limited to, ministries, public agencies, and companies. We will make our research known to international institutions like the OECD and the European Commission, as well as local ministries, relevant agencies, business organisations and NGOs as well as other arenas of relevance such as the Transformative Innovation Policy Consortium (TIPC) and the UNESCO Network of Futures Literacy Chairs. We will use the social media channels of the participating institutions to make the project and its results known to a broader audience. We will publish popularised presentations of the projects in Forskningspolitikk and other magazines. In collaboration with Forskningspolitikk we will also make at least two podcast episodes about the project, inviting experts and stakeholders to debate. NIFU will arrange a special English language workshop based on the project results.

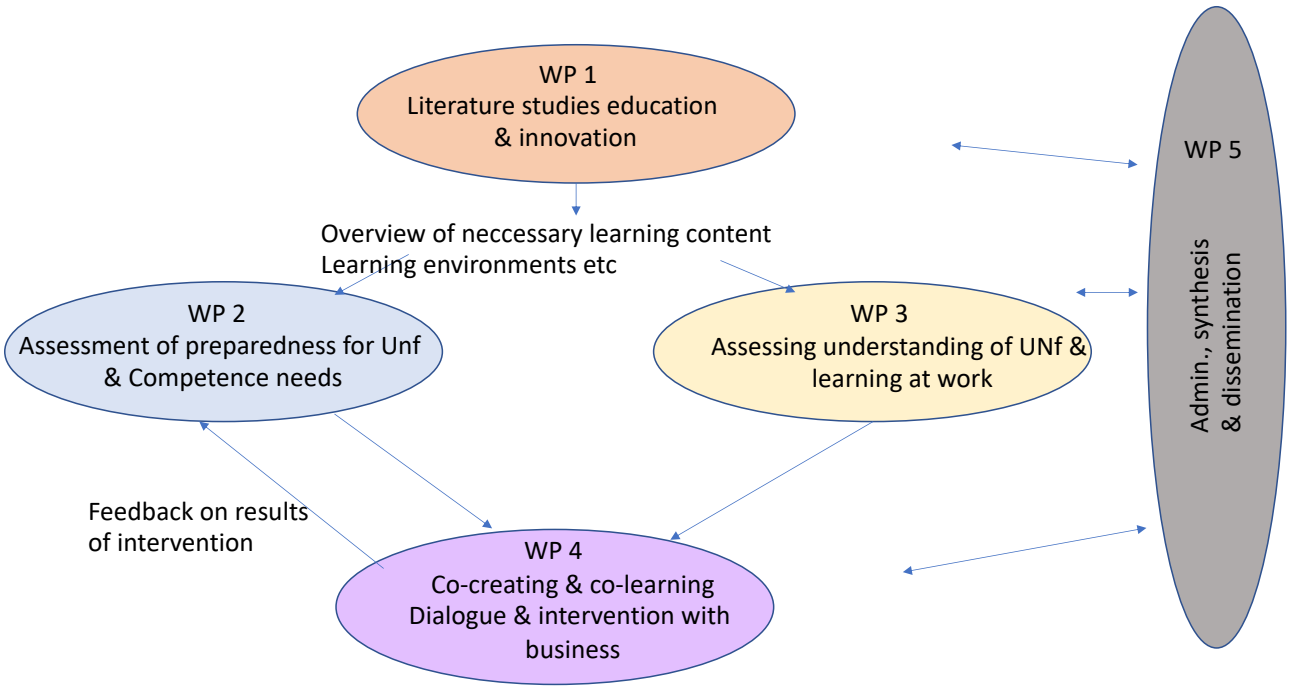
3. Implementation

3.1 Project manager and project group

The project is coordinated by **Dorothy Sutherland Olsen**, working as senior researcher at NIFU, the applicant for this proposal. She has led several research projects funded by the Research Council of Norway and applied research projects for government ministries or private organisations. Prior to her PhD in 2013, Dorothy worked in business in Norway and the UK as project manager for developing ICT products and later as a departmental manager with responsibility for 40 people in Nordea and she has a broad network in academia and business. **Glen-Egil Torgersen** has worked with the unforeseen for several years, led research projects on this theme and edited several important publications. He has supervised PhD students working with unforeseen and has developed methods for assessing preparedness and teaching courses in this theme. Glenn-Egil has worked closely with the Norwegian military in developing concepts for the unforeseen **Ole Boe** has worked on several projects with Torgersen and has developed methods for assessing competence and abilities linked to managing the unforeseen. Ole Boe uses, teaches and supervises students on psychological approaches and studies of management. **Per Koch** has a long career in innovation with an emphasis on policy and conditions conducive to innovation. Per has management experience and unparalleled experience of communicating on innovation and policy to various actors in society. He led an EU Framework Programme project on innovation in the public sector called PUBLIN and chaired the OECD Steering Group on Governance of International Co-operation on Science, Technology and Innovation for Global Challenges (STIG). Per is involved in work with UNESCO on use of anticipation theory and development of methods of visualising alternative futures. **Lisa Scordato** is a researcher at the Nordic Institute for studies in Innovation and Education, NIFU. She has expertise in innovation policies for transformative change and her research focuses on national and international policy development and policy measures for addressing societal challenges. She has experience in policy analysis and innovation governance in the field of sustainability transitions (circular bioeconomy, and clean energy). She has experience from organising futures literacy laboratories involving people from industry, academia, NGOs, public sector institutions and other relevant citizens. **Markus Bugge** is currently associate professor in innovation studies at TIK centre at the University of Oslo. He teaches masters students and supervises PhDs and teaches innovation. He has worked with various theoretical concepts in innovation including innovation in services and the public sector and has participated in many international projects and published widely on the theme. **Pål Børing** has experience of designing surveys aimed as assessing, among other things, employee competence, learning environments and competence planning. Pål uses various quantitative and statistical methods of data analysis and has published widely on findings and methods. **Leif Inge Magnussen** has studied educational science at the University of Oslo and has a PhD on learning outdoors and has published widely on collaborative learning and adult learning outside the formal classroom. He is now leader for the Centre for Security, Crisis Management and Emergency Preparedness at the University of South-Eastern Norway.

3.2 Project organisation and management

The following figure shows the main structure of the project:



We have organised the work into manageable work packages with specific tasks and deliverables. The WP Leader will be responsible for coordination of activities and ensuring deliverables. The project group will have quarterly meetings and annual meetings where all project participants are present, as well as the reference group. The following Gantt diagram explains the planned activities and outputs of the project. We plan a 37 month project period, starting in the last quarter of 2021 and ending in the first quarter of 2025.

Project tasks

	2021	2022				2023				2024				2025
	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
Develop document search strategy														
Identify and analyse research literature						Scientific Paper I								
Adapt & develop existing survey methods														
Data collection- suverys														
										Scientific Paper II				
Analysis of feedback from intervention														
Selection of cases														
Interview with Nonaka & develop interview guide														
Data gathering & analysis cases											Scientific Paper III			
Establish arena for co-creation														
Develop new learning processes & models														
Trial new processes & methods														
Communication			Non-academic publication			Academic Conference paper I			Academic Coference Paper II			Non-academic publication	Academic Conference Paper III	Dialogue workshop with firms/orgs
Synthesis						Scientific Paper IV					Scientific Paper V			
Coordination														

Project organisation and management structure

WP1 leader Professor Glenn-Egil Torgersen from the USN (Participants: Dorothy, Leif Inge, Lisa, Markus)
WP2 Leader Professor Ole Boe, USN (Participants: Pål, Leif Inge, Glenn-Egil)
WP3 Leader Dorothy Sutherland Olsen, NIFU (Participants: Lisa, Per, Markus)
WP4 Leader Per Koch, NIFU (Participants: Dorothy, Lisa, Glenn-Egil, Leif Inge)

A reference group will be appointed which will include external experts from relevant stakeholder organisations. This will help us to overcome some of the challenges of gaining access to interviewees and participants at workshops. Kawano, Hitoshi, Professor, Department of Public Policy at the National Defense Academy of Japan has a special interest in educating for the unforeseen. His work is influenced by Japanese traditions of collaborative learning and creating good learning environments in the workplace. We had originally planned to have him as a full partner in the project, however the formalities have proved too difficult. He will contribute as an active member of the reference group and will advise us on theory and methods and help us to include a more international perspective in our work. He has also invited us to hold a seminar or workshop in Japan. We will also invite Riele Miller from UNESCO and other Norwegian academics to participate in the reference group.

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