

Project partners

Project Owner

Project Owner	
Institution / company (Norwegian name)	FUTURE READY AS
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Website	
Enterprise number	920845932
Is the Project Owner for this project defined as an undertaking according to the state aid rules?	Yes
Size of the enterprise	Small
Is the Project Owner part of the same business concern as any of the partners?	No
Partner's role	Both research activity and financing

Project administrator

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Project manager

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Institution / company (Norwegian name)	FUTURE READY AS
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Collaborating partners and R&D-suppliers

1

Institution/ company	SIMULA METROPOLITAN CENTER FOR DIGITAL ENGINEERING AS
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Application number: ES690125 - Project number: 327924 - IPNÆRINGSILV21
Innovation Project Innovation Project for the Industrial Sector
Next Generation Immersive Learning

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Partner's role	Only research activity
Is the partner for this project defined as an undertaking according to the state aid rules?	Yes
Size of the enterprise	Large
Is the partner part of the same business concern as the Project Owner and/or any of the other partners?	No

2

Institution/ company	INSTITUTT FOR ENERGITEKNIKK
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Postal code	2027
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Partner's role	Only research activity
Is the partner for this project defined as an undertaking according to the state aid rules?	No

3

Institution/ company	CONSORT AS
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Country	Norway

Application number: ES690125 - Project number: 327924 - IPNÆRINGSILV21
Innovation Project Innovation Project for the Industrial Sector
Next Generation Immersive Learning

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Partner's role	Both research activity and financing
Is the partner for this project defined as an undertaking according to the state aid rules?	Yes
Size of the enterprise	Medium
Is the partner part of the same business concern as the Project Owner and/or any of the other partners?	No

4

Institution/ company	HEADSHED AS
Address	Nordre Berggate 2
Postal code	7014
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Partner's role	Both research activity and financing
Is the partner for this project defined as an undertaking according to the state aid rules?	Yes
Size of the enterprise	Small
Is the partner part of the same business concern as the Project Owner and/or any of the other partners?	No

5

Institution/ company	TELIA NORGE AS
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Partner's role	Both research activity and financing
Is the partner for this project defined as an undertaking according to the state aid rules?	Yes
Size of the enterprise	Large
Is the partner part of the same business concern as the Project Owner and/or any of the other partners?	No

Project participants

First name	Last name	Institution/company
Pål	Halvorsen	Simula Met
Michael	Riegler	Simula Met
Rossella	Bisio	IFE
John Einar	Hulsund	IFE
Lars	Kolflaath	Future Ready
Heine	Aabø	Future Ready
Stein	Magnusson	Future Ready
Alexander	Barry	Future Ready

Project info

Project title

Project title

Next Generation Immersive Learning

Primary and secondary objectives of the project

Targeting one third of Norway's workforce -- which deals with customers as part of their job, the primary objective of the Next Generation Immersive Learning (NGIM) project is to provide a conversation engine based on AI to obtain accelerated, more efficient, better and personalized learning and training. We aim to extend the expensive e-learning solutions that currently rely on video and puzzles, with more automated role-play interactions that increase engagement, effectiveness and scale – leading to higher-qualified personnel, and thus more satisfied customers, at a lower cost.

The main objective is addressed through four secondary objectives (O1-04):

- 01 Build an extensive detailed dataset
- 02 Develop the structure and content of a training session
- 03 Building the conversation engine
- 04 Assess the learning effectiveness

Project summary

Proper and correct communication is an important skill for a large number of people in the workforce worldwide. Personnel in for example the service industry, sales, help-desks and call centers must possess communication expertise in order to deliver the message, adapt to responses, always use a friendly tone, etc. However, building high-level competence in this area requires a lot of training and practice, which is expensive and time consuming. McKinsey estimates that the average annual cost associated with the time it takes to coach sales representatives is about \$2 million in 500-employee call centers, and their survey shows great variation in performance, efficiency, skills and not least, time spent.

Online e-learning systems show that online learning platforms can help professionals reach specific skill levels. However, despite the investment in training, service-industry representatives are experiencing increasing demands from customers, competitors and technology, which makes it even more important to deliver more value at a higher speed and for less costs.

In this context, advances in AI and natural language processing make it possible to create programmatic and intelligent ways of offering a conversational experience that will mimic conversations with real customers through an AI-powered training system. Thus, trained on numerous real-world conversations, the idea is to provide a conversation engine that goes far beyond the video and puzzles available today. The aim is to accelerate and personalize learning, giving improved customer satisfaction and increased effectiveness at a much larger scale and greatly reduced cost.

Outcomes and impacts

The project outcome will be a complete AI-based conversation system, better and more efficient at training various types of customer-service personnel. This includes areas such as sales, emergency and financial services. The system should adapt to context, be aware of emotions, etc., just as it happens in a normal real-world interaction between

humans. The proposed system can have a large impact in all conversation training in a huge market. The global market for a conversational AI is expected to grow \$13.9 Billions by 2025, and our proposed solution will standardize and streamline the learning process at a much lower cost and with a higher quality compared to today's e-learning platforms. In the McKinsey report, an estimated cost is around 3000 NOK per person per month, and assuming that we can charge around 1000 NOK for the automated service, there will be a huge saving for the customer, but also large earnings on our side, which means quickly returning the project costs.

Placement

Funding scheme - supplementary info from applicant

Programme / activity	IPNÆRINGS LIV21
Application type	Innovation Project

Topic

Thematic Area	Topic
Enabling technologies	Technological convergence

Classification of scientific disciplines

Filter by subject field	Filter by subject	Discipline
Teknologi	Informasjons- og kommunikasjonsteknologi	Datateknologi

Other relevant programmes/ activities/projects	
If applying for additional funding, specify project number	
Is this proposal related to other grant applications or ongoing projects allocated support from the Research Council and/or any other public funding scheme?	No

Progress plan

Project period

From date (dd.mm.yyyy)	30.06.2021
To date (dd.mm.yyyy)	31.12.2024

Main activities and milestones in the project period (year and quarter)

	Milestones throughout the project	Main activity / Category	From	Quarter	To	Quarter
1	Data collection and cleaning	Industrial research	2021	4	2024	2
2	Conversation analysis	Industrial research	2021	4	2024	4
3	Training construct	Industrial research	2022	1	2024	2
4	Training recipes	Industrial research	2022	3	2024	2
5	Conversation engine	Industrial research	2022	1	2024	3
6	User interface for training	Industrial research	2022	1	2024	3
7	User interface for evaluation	Industrial research	2022	2	2024	3
8	Prototype development	Experimental development	2022	3	2024	4

Budget

Costs per project partner per main activity (NOK 1000)

The heading of the table displays the activity numbers for main activities as these are listed in the Progress plan (when they have been entered). The selected category appears in parentheses.

	1 (IF)	2 (IF)	3 (IF)	4 (IF)	5 (IF)	6 (IF)	7 (IF)	8 (EU)	Sum
FUTURE READY AS		12530							12530
SIMULA METROPOLITAN CENTER FOR DIGITAL ENGINEERING AS		5750							5750
INSTITUTT FOR ENERGITEKNIKK		5750							5750
CONSORT AS		1360							1360
HEADSHED AS		280							280
TELIA NORGE AS		1360							1360
Totals	0	27030	0	0	0	0	0	0	27030

Cost plan (NOK 1000)

	2021	2022	2023	2024	2025	2026	2027	2028	Sum
Payroll and indirect expenses	984	3402	4172	5372					13930
Procurement of R&D services	400	4500	4500	2100					11500
Equipment	76	308	308	308					1000
Other operating expenses	0	200	200	200					600
Totals	1460	8410	9180	7980	0	0	0	0	27030

Specification

Future Ready has built an MVP that has been added as equipment and a tool that will be used throughout the project. From 2021 - 2024. It is therefore in the budget and will be amortised over three years.

Cost code (NOK 1000)

	2021	2022	2023	2024	2025	2026	2027	2028	Sum
Trade and industry	1060	3910	4680	5880					15530
Research institutes	400	4500	4500	2100					11500
Universities and university colleges									0
Other sectors									0
Abroad									0
Totals	1460	8410	9180	7980	0	0	0	0	27030

Funding by project partner (NOK 1000)

	The Research Council	Own financing	Other funding	Sum	Specification of other funding
FUTURE READY AS	16000	8030		24030	
CONSORT AS	0	1360		1360	
HEADSHED AS	0	280		280	
TELIA NORGE AS	0	1360		1360	
Totalsum	16000	11030	0	27030	

Funding plan (NOK 1000)

	2021	2022	2023	2024	2025	2026	2027	2028	Sum
Own financing	596	3432	3746	3256					11030
International funding									0
Public funding									0
Private funding									0
The Research Council	864	4978	5434	4724					16000
Totals	1460	8410	9180	7980	0	0	0	0	27030

Specification

Fellowship

Type of fellowship	From date (dd.mm.yyyy)	To date (dd.mm.yyyy)
Post-doctoral research fellowship	01.01.2022	31.12.2024

Attachments

Project description

Project description	ES690125_001_1_Projektbeskrivelse_20210415
Reference	IPN project description.pdf

Curriculum vitae (CV)

Curriculum vitae (CV)	ES690125_002_1_CV_20210415
Reference	CV-John Einar Hulsund.pdf

Curriculum vitae (CV)	ES690125_002_2_CV_20210415
Reference	CV-Rossella Bisio.pdf

Curriculum vitae (CV)	ES690125_002_3_CV_20210415
Reference	M Riegler.pdf

Curriculum vitae (CV)	ES690125_002_4_CV_20210415
Reference	P Halvorsen.pdf

Curriculum vitae (CV)	ES690125_002_5_CV_20210415
Reference	S Funke.pdf

Partner information

Partner information	ES690125_017_1_Bedriftsopplysninger_20210415
Reference	Consort - IPN partner company 15.01.pdf

Partner information	ES690125_017_2_Bedriftsopplysninger_20210415
Reference	FR - IPN.pdf

Partner information	ES690125_017_3_Bedriftsopplysninger_20210415
Reference	Headshed - IPN partner company 15.01.pdf

Partner information	ES690125_017_4_Bedriftsopplysninger_20210415
Reference	IFE - IPN partner company 15.01.pdf

Partner information	ES690125_017_5_Bedriftsopplysninger_20210415
Reference	Simula Met - IPN partner company 15.01.pdf

Partner information	ES690125_017_6_Bedriftsopplysninger_20210415
Reference	Telia - IPN partner company.pdf

Project description for *Innovation Projects for the Industrial Sector*

PART 1: The planned innovation

1. Underlying idea

The main idea behind the Next Generation Immersive Learning (NGIM) project is to redefine how we teach advanced skills to service-industry representatives. It is currently a challenge to teach sales and customer service skills because online solutions lack interaction and feedback, and offline training is inflexible and expensive. As a result, there is a strong need for new training solutions to enable accelerated and personalized learning.

Almost one third of Norway's working population must deal with customers as a part of their job [1]. Whether it is customer service centres, telemarketing or emergency helplines, this part of the economy is increasingly vital to economic growth. It has long been a common belief that people who perform well in these jobs have innate abilities and that people who do not, will not be able to acquire them fast enough to succeed [2]. The NGIM project will radically challenge this misconception.

Traditionally, service-industry representatives learnt the ropes of their trade through classroom-based training, on-the-job training or often, without any training at all. The instructor-based model is usually employed by large corporations as they have resources to invest in training, but it is beyond the reach of smaller organizations and public services [3]. The most effective way to learn the complex skill set of service-industry representatives is through role play, but few companies use actors in role plays because they are expensive to set up and run. In sum, even though training delivery has evolved over the years from instructor-led classrooms to online platforms such as e-learning, the state-of-the-art learning solutions are not suited to the development of service-industry representatives. The key problem of today's e-learning platforms is that they are too far removed from real-world and applied learning experiences.

For the first time, advances in artificial intelligence (AI) and natural language processing (NLP) make it possible to create a programmatic and intelligent way of offering a conversational experience that will mimic conversations with real customers through an AI-powered training system. Our proposed solution leverages these technologies to make it easier to learn advanced customer service skills in a standardized way. The value creation (innovation concept) in this project is the development of conversation engines to create natural customer conversations and, based on these conversations, provide personalised tailored feedback that maximises learning effectiveness. To achieve this, we aim to build an AI-powered training system that helps develop and refresh service sector skills using flexible, realistic and context-aware conversation engines. These engines will be designed to enable service-industry representatives to develop and maintain the advanced skills that they need to be successful in their job.

The main goal of the project is to improve today's training for employees in customer service centres by taking advantage of role play through an AI-based conversation engine.

2. Level of innovation

The innovation involves *new methods for employee training using an advanced conversation engine as well as new methods for management to follow up training of workers*. For sales organisations, the innovation in these areas is required to develop and maintain high employee satisfaction. Improved product services include accelerated learning, personalized training, improved customer satisfaction, coaching at scale, increased sales effectiveness, increased customer service skills, reduced turnover, competitive advantage and increased engagement.

Online training is not new, but enhanced with an AI powered context aware conversation engine, it becomes unique. The plan to design and implement such an engine is bold, but not unfeasible given recent technological developments. Finally, the design of this project is novel. In the project, scientists will be working with and closely addressing the needs of professionals in the workplace from beginning to end. Everything from designing the conversation engine based on workplace generated data (e.g. phone calls), to studying professionals' use of the designed system to judge effectiveness in relation to real-world needs. Thus, the way that the project is devised challenges traditional understandings of a linear, one-way connection between science and praxis. Further development and use of realistic conversation engines paired with feedback to the trainees may be the future of training as the sales simulation tool allows service-industry representatives to train when they have time available, and have booster sessions with the engine between calls and other tasks in their daily work.

The project's goal shall be realized through innovation in three main areas (I1-I3):

11. **New training method**, expected innovations: AI conversation engine enabling role based training being available anytime, anywhere - rather than dependent on a coach. The engine will use natural language interaction that can be used by the service-industry to train their representatives in advanced skills related to their job and measure their learning. An innovative framework for defining training recipes as input to the conversation engine is required and the project starts with a use case in sales where Future Ready already has built a minimum viable product based on customer need.
12. **New intuitive trainee feedback**, expected innovations: Feedback to the trainee is objective, created automatically, and available directly, as well as being aggregated to the management for employee follow up; Innovative AI based analysis and evaluation of training results presented in an intuitive and user friendly interface. Our solution is different from our competitors who are in the same market (call centers), such as Cogito in the USA, and Jabber (Cisco) in Norway, who analyze the sales call in real time. These solutions give the seller insight, but no coaching or the opportunity to practice. Furthermore, there is sales training in e-learning format, but we have greater potential for value creation due to technology, interactivity and feedback. We give sales people the opportunity to practice realistic sales situations with a conversation engine that plays the role of customer. The salesperson then receives feedback from the system, which can lead to a seven percentage points increase in efficiency [4].
13. **New business areas**, expected innovations: Once the project has refined the technology, we can employ several use cases in areas as diverse as customer service, emergency services, health, psychological well-being, smart cities, as well as feedback-intensive learning in the workplace. In order to achieve this, we would need the most advanced building blocks of current conversation and language understanding technology. Based on the use case, the conversation engine should be able to impersonate a customer with high accuracy. Each conversation engine representing a customer should be enriched with actual call data between service-industry representatives and customers.

The project has three competitive advantages with our innovations. An important competitive advantage is timing. AI technology has developed exponentially in recent years, and it is only now that the technology is mature enough to enable what Future Ready wants to achieve. Furthermore, our development of proprietary algorithms for conversational engines is an advantage that builds under this lead. This is in addition to the fact that we will gather knowledge, insight and data from the customer. This will lead to replacement costs for the company and make it less attractive to change the Future Ready solution. Collection of data points and call data will also help to be able to tailor the solution.

3. Potential for value creation

According to research, the global market for Conversational AI is expected to grow from \$4.8 Billion in 2020 to \$13.9 Billion by 2025 [8], and grow at a compound annual growth rate of 21,9% [5]. We are at the beginning of a megatrend where the new standard will be digital sales meetings to save time, money and the environment. In a report from Salesforce, 60% of salespeople report an increase in digital meetings even before the pandemic in the time period from 2015 to 2018 [6]. During the ongoing Covid-19 pandemic, we see how fast the change has taken place.

What is new is that many will work from home and a solution for companies to follow up with their employees remotely will make it easier to develop and retain employees. In light of recent changes, this trend will intensify. and it will become common to sell to customers over video conferencing. The proposed solution will provide the support for such practices, and the potential for value creation is mainly driven by three factors; a desire to streamline internal sales processes (such as training), reduce costs and increase sales. According to a study by McKinsey, the average annual cost associated with the time it takes to coach sales representatives is about \$2 million in call centers with 500 employees [4]. The survey shows great variation in performance, efficiency, skills and not least time spent coaching salespeople. Further, Baumgartner and colleagues showed that sales teams adopting AI based solutions see an increase in leads and appointments of more than 50%, cost reductions of 40%-60% and call time reductions of 60%-70% [7]. All these points are addressed by the proposed solution, and we predict that our solution will achieve similar results in the time it takes to onboard new sales representatives, reduce turnover, and increase sales and customer service satisfaction.

As a SaaS company, we will employ a license-based business model where customers pay for our services per user and month. We estimate that given the value we create with the conversational engine we will be able to charge 1000 NOK per user per month. Assuming an average of 50 users per customer we are looking

at potential annual recurring revenue per customer of 600 kNOK. Our business model is highly scalable and assuming a positive outcome in the proposed innovation project Future Ready will be well positioned for exponential growth in the coming years. For our pilot customers participating in the project, Consort, Headshed and Telia, there is significant potential for value creation in optimising training of employees, cost reduction and increased sales. Finally, note that even though our initial customers target sales training, the technology is transferable to the customer service sector in general as well as smart cities, hence greatly increasing the future value creation of the project.

4. Project participants and constellation of partners

4.1. Research-performing and financing partners

Future Ready (C1) is a SaaS company providing smart training. We work with companies in finance, media and telecom to help improve their outbound sales and customer service. We improve people's skills in telemarketing and customer service. The way we do this is by using smart technology like language and voice analysis to make practicing skills effective and systematic. Employees are provided with objective and consistent skills training. Managers get practical tools for coaching, targeted at the strengths and areas for improvement in their teams. The Future Ready platform makes learning part of everyday work and supports sales and customer service reps when they need it the most.

Consort (C2) A leading call center working with public and private companies helping them talk to their customers. Consort will provide feedback and user generated insight allowing us to receive valuable feedback quickly and iterate as needed. Consort will provide access to calls.

Telia (C3) Telia Company is the second largest supplier of mobile services in Norway and offers a complete range of services for businesses and consumers. Their involvement in the project will be to test the solution and they will be an important part of the measurement of learning and impact on performance.

Headshed (C4) Headshed is a Norwegian company with an innovative CRM system. Headshed has joined the project because of their interest in creating a platform where companies can find and contract sales-representatives in cooperation with Future Ready.

IFE (R1: Institutt for energiteknikk) has a long tradition in providing human-centred digitalization in safety critical and related domains as for nuclear power plants, process industry and transport. Their team from digital systems has extensive knowledge and experience from applied research within the domains of human automation collaboration and AI which will contribute to establish a safe and trustworthy environment for interaction between the human and the conversation engine. The project targets ethics and trust in AI in real-world application which is one of our research areas. Through this project IFE will acquire knowledge in the analysis of human interaction through natural language. In particular, we will focus our attention on elements in the interaction that leads to increased perception and credibility between people. For many years we have researched intensively on how humans perceive and act on the basis of the information that machines provide them, here we will supplement this knowledge through methods for analysing the conversations that are conducted in a scenario. This will be a valuable competence that IFE will utilize in its further research on human-machine interaction and studies of collaboration between humans in a control room setting. The competence and methods will also be valuable in training and education of control room personnel. This will further support our research in human automation collaboration in various intelligent mobility projects and in our human robot interaction research. This project will bring valuable input and experience to the AI Cluster.

SimulaMet (R2: Simula Metropolitan Center for Digital Engineering) is a research unit that is jointly owned by Simula Research Laboratory and OsloMet (Oslo Metropolitan University). It is the home of Simula's research activities on networks and communications, machine learning and IT management, and it is OsloMet's strategic partner in research and postgraduate education. The Holistic Systems department has for a long time investigated AI-based solutions in the areas of health, sports and environment studies, and our goals and objectives in the proposed project are to produce interesting and relevant research and generate ideas potentially being used by industry or society in general. The research group also has a related AI-based avatar project for training police interviewers. This project targets a real-world open challenge, and the potential for impact is large. Thus, we seek interesting challenges and research problems, that can result in good published papers, student theses, and research prototypes, i.e., the value for our research department is the research, the prototypes, experiences and the resulting papers that will strengthen our research profile and can be used further in our future research in AI. SimulaMet will be responsible for supervision of one PostDoc researching the AI components of the proposed systems.

PART 2: The R&D activities

5. Need for research

Like learning any other complex practical skill, sales representatives and service personnel are trained with several core elements like best practices, instruction from experts and detailed feedback. This training is generally realized through role-playing sessions, which presents limitations like contextualization, realism and evaluation objectivity, and require a lot of resources in terms of money, time, and human labour. The hypothesis is that an artificial interactive conversation engine trained on real-world conversations can be a new, cost-effective method for training.

In this context, chatbots have recently obtained a lot of attention as they can provide an intuitive and easy-to-use natural language human-computer interface, and they are frequently used to replace and supplement service personnel. Thus, several frameworks exist that can be integrated into the proposed solution. The AI-based conversation technology is basically working in “easy” scenarios, even providing realistic results using language models like Generative Pre-trained Transformer 3 (GPT-3). However, they are not yet commonly employed in the enterprises or for training, and there is limited prior research contribution towards this topic. In order to function well in our complex, possibly non-structured conversation training where the system must adapt to the conversation partner, existing models are individually not powerful enough nor trained on sufficiently good data. Holistic thinking is required to integrate everything into one efficient real-time pipeline. Moreover, the domain knowledge from the target sales and service/help-desk case studies in combination with emotions and novel AI methods will be a key enabling “issue” in order to research and develop the proposed conversation engine.

6. Objectives

Our main objective is to *provide a conversation engine based on AI to obtain accelerated, more efficient, better and personalized learning and training*. We aim to replace the inefficient e-learning solutions that currently rely on video and puzzles, with more automated role-play interactions that increase the engagement, effectiveness and scale – leading to higher-qualified personnel, and thus more satisfied customers, at a lower cost. We expect that participants will conduct higher quality customer conversations after training with the engine as compared to currently available training methodologies, be it an instructor or an e-learning platform.

The main objective is addressed through four secondary objectives (O1-O4) illustrated in Figure 1:

- O1. To build an extensive detailed dataset of service conversations, which will serve as a foundation for training of conversation engines. This objective requires data collection, conversion and cleaning of service conversation into a structured form to be ready for analysis and used in training AI models.
- O2. To develop the structure and content of the training lessons, ensuring that it has a gamification aspect, and to identify when and what kind of feedback should be provided to the trainee during or after each session to maximise the learning outcome.
- O3. To build guided conversation engines trained on the real-conversations between customer and service representatives. It will mimic the role playing aspect of instructor based training and it will be influenced by the learning structure defined during developing training recipes.
- O4. To assess the learning effectiveness of the conversational engines and feedback. We will conduct user experiments to demonstrate that the proposed training solution is not only cost effective but also more effective in learning compared to current solutions. This also includes comparing human-versus machine-based training.

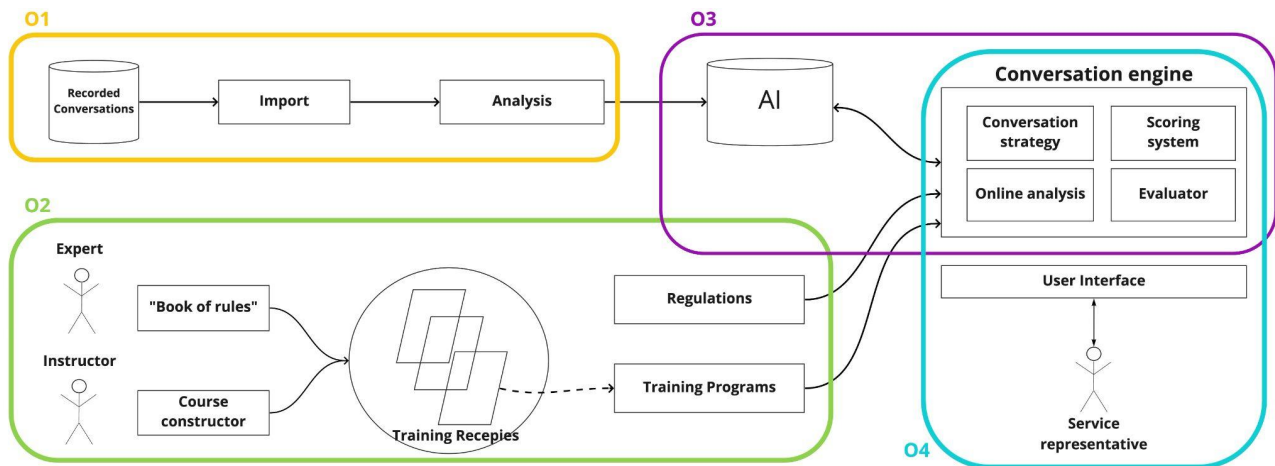


Figure 1) Overview of main elements required for the different objectives and their interplay.

Each objective contributes to the innovation areas defined in Section 2. Specifically, objectives O1-O3 contribute to the innovation area I1 *new training method*, while O3 contributes to the innovation area I2 *new intuitive trainee feedback*. Finally, all objectives contribute towards the innovation area I3 *new business areas*, as the design of the proposed conversation engine is domain agnostic.

7. R&D challenges and scientific methods

Building a complete end-to-end system is challenging, and the objectives (O1-O4) raise a set of research challenges that need to be addressed. The project will follow a user centered design and iterative process which will involve end-users in user experiments. Developing an intuitive human machine interface is vital to obtain our goals of accelerated learning and coaching. Furthermore, all project participants have experience in the area of experimental research, and we therefore use evolutionary prototyping to accomplish the project goals. The best venues for publishing research results in this area today require experimental results from real-world systems. As such, developing a proof-of-concept prototype is an important part of this project. Building running prototypes also allows for easier experimental testing, and it is a huge step towards creating a running system and a final product.

For O1 *Build an extensive detailed dataset*, data from real-world conversations must be collected, cleaned and processed. Further, to use AI methods on the dataset, we need to extract a set of key features from the dataset together with classification information. We intend to use multiple methods to generate variables that can be used as input to an AI module: 1) Speech to text, 2) Speech rate, 3) Voice pitch and 4) Syllables rate, 5) Sentiment analysis and 6) Topic modeling. The collected data can be used as input to a set of neural nets together with the annotated dataset. A possible challenge will be that the available dataset is too limited in both size and variation to get the features we want with sufficient statistical significance. A way to overcome this problem is to supply extra datasets. Such a dataset can be e.g. the Nordic Dialect Corpus and Syntax Database [12] which contains transcribed interviews in Norwegian.

For O2 *Develop the structure and content of a training session*, we must establish a way to model training objectives based on the combination of expert “know how” and modern teaching methods. These models form the training recipes which must be compiled into a training program used by the conversation engine. A challenge will be how to convert expert “know how” to effective role play scenarios that resemble real world experiences [13].

For O3 *Building the conversation engine*, there are challenges related to areas like transforming data between text and speech, language models, sentiments, etc. Several components exist and new ones must be researched, that all must meet the particular scenario requirements. Then, there are large challenges in order to research efficient configurations of these components and integrating them into a real-time pipeline finally enabling users to interact with the system in real time, i.e., meeting both functional and non-functional requirements.

For O4 *Assess the learning effectiveness*, the cost of adoption to the newer training programs is due to the amount of resources required to reorganize existing training programs unless corporations are presented with the clear benefits for adopting to the newer training programs. It is a very challenging task to provide the evidence of advantages of a training program based on a conversational engine over traditional programs. It would require the comparative analysis for effectiveness of learning of existing models compared to the proposed one. Definition of the different metrics of evaluation according to the targeted user.

8. Project plan

8 a) Main activities (“work packages”) under the project

The work is structured in 6 work packages (WP1-WP6). Each of these include activities related to project management, dissemination and communication of results (described in Section 12). Table 8 b) provides an overview of the milestones and Gantt diagram and Table 8 c) provides the budgets for each work package. Information about participants in the different work packages are provided in Table 8 d).

WP1 - Data collection and cleaning (Responsible Future Ready / R&D category: industrial research)

The first task is to collect relevant conversation data from our industry partners and publicly available conversation data. We expect data from a total of 72 800 conversations in Norwegian, each consisting of voice recordings, as well as detailed meta-data about the call. During this process there will be strict compliance with ethical practices for data collection, also ensuring the security and privacy of the customer information throughout the evolution of the product. The next step is to clean the data as generally transcription data for the calls is not well structured and needs to be transformed into machine usable format. Further, the voice data will be transformed into textual data through speech-to-text solutions. Here, we will primarily rely on commercially available speech-to-text models, potentially further trained with some manually transcribed conversations from our own data-set.

Tasks (T) and expected outcome/results (R):

- T1.1 - Literature review of existing chatbot datasets
- T1.2 - Acquire sales conversations and metadata from commercial partners
- T1.3 - Check compliance with regulations
- T1.4 - Perform speech to text conversion and clean data
- R1.1 - Transcribed calls of various call scenarios
- R1.2 - A privacy statement which states privacy concerns how long we will keep the call recordings

WP2 - Conversation analysis and AI modeling (Responsible IFE / R&D category: industrial research) is proposed to process the collected data with natural language text methods, using e.g. the NLTK module in Python [10] or Cognitive Services from Azure AI. The collected text will be subject to sentiment analysis. In sentiment analysis the bias towards a positive or negative attitude is evaluated. Sentiment of the conversation leaning towards negative or positive during the conversation can be used to guide the conversation model and evaluate the trainee's performance. Similarly, objectivity and subjectivity can be determined through the conversation. Scoring tables for Norwegian words from the SANT project [11] for sentimental analysis in Norwegian. Then to identify similar calls and create real world scenarios robustly we plan to employ an unsupervised learning like LDA clustering to perform this task. Furthermore different AI models will be trained to identify the key moments, entities and intents in the conversation.

Tasks (T) and expected outcome/results (R):

- T2.1 - Sentiment analysis of the collected text
- T2.2 - Topic modeling of the collected text
- T2.3 - Use AI modeling to identify the success rate using speech rate, pitch and other speech features
- R2.1 - Negative or positive score from sentiment analysis for each sentence.
- R2.2 - Keyword based topics based on topic modeling for each sentence.
- R2.3 - AI model to foresee the level of trust based on speech features

WP3 - Training construction and recipes (Responsible Future Ready / R&D category: industrial research)

Training people on advanced communication skills is time consuming and the skills needed are difficult to replicate. In this work package, we want to design an effective training framework for constructing courses and training recipes based on domain expertise input and governing regulations. We plan to do that by

gamifying and uniforming effective aspects of the traditional constructor based training and e-learning methods. We aim to create a standardized system for certifying the user.

Tasks (T) and expected outcome/results (R):

- T3.1 - Establish training recipes with training objectives, goals etc.
- T3.2 - Establish immersive training environments with real conversations
- T3.3 - Gamification of training aimed at people with different skill levels
- R3.1 - Training recipes, gamification of scenarios
- R3.2 - Standardized certification

WP4 - Conversation engine (Responsible SimulaMet / R&D category: industrial research) is proposed to develop a conversation engine supporting guided conversations by researching and integrating several components covering several areas. First, we need guided conversation. The challenge here is that chatbots today are only capable of answering simple questions. We need to go beyond this and be able to understand contextual data (for example, user profile, user goal, conversation history, user response, sales knowledge) and integrates multiple factors into the conversation, such as the customer's persona, the general sentiment of the conversation and how it changes over the duration of the call. We also need to convert between text and audio/speech during such conversations. There are tools and natural language processing (NLP) components available, but they must be configured to our purpose, and their accuracy in languages like Norwegian is not comparable to what has been achieved in English. Also, related to WP6, a prototype must be made integrating all these components in a real-time pipeline in order to allow live interactions.

Tasks (T) and expected outcome/results (R):

- T4.1 - Literature review of existing chatbot datasets, speech-to-text and text-to-speech systems
- T4.2 - Interaction between training sets, conversation engine and scoring module
- T4.3 - Interview standards and governance and regulations
- T4.4 - Norwegian language models
- T4.5 - User interface to the conversation engine with end user involvement
- R4.1 - A prototype conversation engine able to perform guided conversations on a limited set of scenarios.

WP5: System assessment/Trainee feedback and learning outcome (Responsible IFE / R&D category: industrial research) is proposed to perform experiments with end users to measure the learning effects and goal achievement comparing training with coaching versus training with the conversation engine. Develop intuitive, concrete, fast and accurate feedback to the trainee and aggregated information to management. A user centered design process will be followed with end users involved. Feedback-to-trainee: Develop a method to quantitatively track the trainee and provide feedback during and after the training. Measurement of the learning effect will be explored by applying methods from crowdsourcing studies (gold questions, time spent, understanding testing, self-evaluation, etc.). One possible feedback approach is to have the system give cues to the trainee during the call based on customer sentiment and verbal signals. During the assessment phase, we will provide feedback at the end of the call about the trainee's performance on different scenarios, with a special focus on those scenarios that they found difficult.

Tasks (T) and expected outcome/results (R):

- T5.1 - Develop and evaluate a quantitative method for measure learning effect
- T5.2 - Gamification and learning scores based on the method developed in T5.1
- T5.3 - Self-evaluation
- T5.4 - Performance feedback for the management
- T5.5 - User interface for trainee feedback with end user involvement
- T5.6 - User experiments to assess the system
- R5.1 - Intuitive user interface for the conversation engine that supports accelerated learning and coaching.

WP6: Prototype development (Responsible Future Ready / R&D category: experimental development) is proposed to develop the conversation engine prototype based on input from WP2-WP5 and it will be used in usability studies planned in WP4 and WP5.

Tasks (T) and expected outcome/results (R):

T6.1 - Development of the training construct

T6.2 - Development of the AI conversation engine

T6.3 - Development of the user interfaces

T6.4 - System development

R6.1 - Prototypes which are to be used in usability studies and user experiments

8 b) Budgeted project costs distributed by main activity

Table 8 b) Distribution of costs by main activity

No.	Title of main activity / work package	Budgeted costs: (NOK 1000)	Costs: Industrial research	Costs: Experimental development
WP1	Data collection and cleaning	4 000	4 000	
WP2	Conversation analysis and AI modeling	5 000	5 000	
WP3	Training construction and recipes	4 000		
WP4	Conversation engine	5 000	5 000	
WP5	System assessment/Trainee feedback	5 000	5 000	
WP6	Prototype development	4 000		4 000
Total	Entire project	27 000	23 000	4 000

8 c) Critical milestones for the R&D activities

Table 8 c) illustrates the main milestones in the form of activities with deliverables for the R&D activities (WP2-WP6) in a Gantt diagram. The project will have several iterations of concept development which are represented through 3 deliverables “x” for each activity.

Table 8 c) Distribution of tasks and responsibility in the project

R&D	Milestone	Description	2021		2022				2023				2024			
			Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
WP2	M2.1	Conversation analysis					x				x				x	
WP3	M3.1	Training construct						x			x				x	
	M3.2	Training recipes						x			x				x	
WP4	M4.1	Conversation engine							x			x				x
	M4.2	User interface for training							x			x				x
WP5	M5.1	User interface for evaluation							x			x				x
WP6	M6.1	Prototype development							x			x				x

Milestone M2.1 *Conversation analysis* is important because it will show what we can expect from the “intelligence” of the solution. How well are we able to extract key features from a conversation? Further, milestone M4.1 *Conversation engine*, follow as equally important because this will show us how well the intelligence can follow a natural conversation and identify the “type of conversation”. We want an iterative approach to the milestones to secure progress and results.

8 d) Project organisation and management

The project will be organised and managed by Future Ready. Future Ready oversees and ensures the overall progress of the project. Further, Future Ready will act as a link between the commercial and research partners. Each R&D partner is responsible for one or more WPs. The responsible partner organises regular meetings between the participating partners of the WP, and ensures the progress of all tasks within the WP. Future Ready will organise a kick-off, as well as annual project meetings, where all partners present their progress and share their experiences. The project manager has been chosen based on his extensive previous experience from managing research as well as industrial consultancy projects. Table 8d) illustrates the activities for which each partner is responsible and will be participating.

Table 8 d) Distribution of tasks and responsibility in the project

Partner	Name of partner	Responsible for main activity:	Participating in the following main activities:
C1	Future Ready	WP1, WP3, WP6	WP2, WP4, WP5

C2	Consort		WP1
C3	Headshed		WP1
C4	Telia		WP1
R1	IFE	WP2, WP5	WP1, WP3, WP4, WP6
R2	SimulaMet	WP4	WP1, WP2, WP3, WP5, WP6

9. Funding

The project will be funded by in-kind contributions from the project partners alongside cash contribution from the project owner and the funds from the Research Council. Funding from the Research council is critical for the project. Future Ready is a small company in a challenging growth phase where our limited resources supported by early customer revenues and investor funding are naturally directed towards deliveries and economic growth based on our current technology. Our existing investors have clearly stated that they are willing to follow up their investments given that the company continues to deliver on our ambitions. The company will also seek to attract other potential investors as a means to mitigate the risk of financing issues.

PART 3: Plan for implementation and utilisation of results

10. Realisation of value creation for the Project Owner and partners

Future Ready will during and after the project period seek to commercialise upon the results from the project work packages. Project results will be implemented into our service offering towards customers in parallel with the project. This strategy will shorten our time-to-market and will allow us to “lock in” existing customers and gradually increase our customer base as we build a great product and streamline our business model. Norway is our initial market where we intend to develop our product in collaboration with local pilot customers. The market internationally is much larger and we intend to go internationally when we have ~15 paying customers in the domestic market, projected in 2023. Table 10 a) outlines the milestones.

Table 10 a) Overview of realisation of value creating milestones in the project

Milestones	2021		2022			2023			2024		
IPN Project											
Project results implemented in product					x		x				x
Entry international market								x			
New equity (MNOK)		3M			3M			5M			3M
No. of employees (R&D)	9 (4)		13 (5)			16 (5)			30 (7)		

Competition/ market risk

Given the significant potential for value creation in our field we must expect that competitors will attempt to establish themselves in the market. We believe that we have a good overview of the current market situation and do not currently see any direct competitors, which has also been confirmed through our pilot customers. Our strategy for staying ahead of potential competitors is to work closely with both competent R&D partners such as IFE and Simula and pilot customers to secure a solution with advanced functionality which meets the customers' needs. We will not pursue patent protection of our solutions. We firmly believe that our proposed solution is ideal for the training of communication skills between humans.

11. Socio-economic benefits and contribution to sustainable development in society

The main research challenges around the use of AI for NLP is highly relevant for humans will interact with machines and services provided by machines. We believe AI and NLP will be used in smart cities for services where the public gains access to information by a natural conversation with machines. For example, an elderly person, with difficulties navigating the Internet, can book an appointment through a natural conversation over the phone with a machine. Moreover, a machine which can call and make vaccination appointments with a whole population, or a person entering a large hospital, and interacts with an electronic "service desk" to get information on where to go. Many elements of a smart city will rely on conversation engines to achieve the goal of a cleaner, greener and more secure society. Conversation engines will help cement a trustworthy interaction between inhabitants and digital services through a natural voice conversation. In fact, making cities smart and sustainable is part of the United Nations and the EU's goal. Further, the use of voice control and interaction through natural conversation is likely to increase in consumer products, all from games, teaching, household devices to smart homes.

12. Dissemination and communication of results

The results will be disseminated to the academic community internationally, providing empirical data and evidence-based research on sales interviews and service conversations. A central aim of our research effort is publication of scientific articles in peer-reviewed applied journals and conferences. The main target conferences are ACM MM and MMSys, NeuIPS and ICML. For journals, we will focus on ACM TOMM, IEEE TMM and Nature Machine Intelligence. In addition, the results will also be made available in social media and in a project website. Also, to communicate the results of the project to conferences covering sales and customer service is a realistic goal. The wider conversational AI community will be one place where we can communicate the results of the project either as part of local start-up events in Norway or internationally. To attend the Sales Enablement Summit, the largest collective of organisations interested in sales and customer service is a great arena to communicate the results of this project.

PART 4: Other information

13. Ethical perspectives

The collection of authentic, transcribed conversations and interviews from training sessions and sales must adhere to special ethical requirements for the use of sensitive data that involves people. We also aim to add personality and sentiments to the models, so privacy must be handled with care. The project will be registered with the Norwegian Centre for Research Data. This project intends to employ technology in a strictly positive manner. However, it is possible to train AI models using unethical examples of input data, and we can not control if the future service is used to sell unethical products. This is a general challenge with this type of software, but our use will be to create a service training communication skill in a structured, efficient and ethical way. Further, every partner is familiar with the ethical standards put forward by the Research Council and obliged to these. In addition, every partner institution has their own ethical guidelines that will be followed.

14. Gender issues (Recruitment of women, gender balance and gender perspectives)

In the recruitment of new project participants, we will target gender equality. The team will be particularly attentive to avoiding gender stereotypes in the creation of the conversation engines, male and female, as they should not create or reproduce gendered expectations of interview-trainees of the project team. The developed solution should instead provide approximations of real-world people.

15. Additional information specifically requested in the call for proposals

No previous applications have been submitted on the topic.

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8. Markets and Markets. Conversational AI Market. Report TC 6976.
9. Zaledon, L. Virtual Sales is on the Rise. Research Tells Us Why. <https://www.salesforce.com/blog> (Accessed 1. april 2021)
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Curriculum vitae

* ROLE IN THE PROJECT

Project manager ☐ Work package leader ☒
 Project partner ☐ Other (specify) ☐

* PERSONAL INFORMATION

*Family name, First name:	Hulsund, John Einar		
*Date of birth:	23.04.1965	*Sex:	Male
*Nationality:	Norwegian		

* HIGHER EDUCATION/OTHER TRAINING

	Subjects/degree/	Name of institution, country
1993	Physics / Cand. Scient	Univerity of Bergen, Department of physics, Norway
1993	Physics and mathematics / Lektor	University of Trondheim, Educational seminar, Norway

* POSITIONS (academic, business, industry, public sector, national or international organisations)

Current Position

	Job title/name of employer/country
1997-	Senior Scientist, IFE, Norway

Previous positions held (list)

	Job title/name of employer/country
1994-1997	Lektor, Østfold fylkeskommune, Norway
1993-1994	Lektor, Narvik Ingeniørhøyskole, Norway

PROJECT MANAGEMENT EXPERIENCE (if applicable)

	Project/topic/role in project/funding from
2007-2010	eLAD - "e-Centre Laboratory for Automated Drilling Processes", Role: Project leader from IFE. Funding from: Petromaks. Partners: IRIS, CMR, IFE, Statoil and ConocoPhillips Norway.

EXPERIENCE FROM NATIONAL/INTERNATIONAL COLLABORATION/NETWORKING (if applicable)

	Activity or project / tasks and responsibilities / context/programme/framework of the collaboration and names of key partners (companies, institutions)
2000-2020	OECD Halden Reactor Project, Project leader, Context: Software development for electronic procedures, condition-based maintenance. Key partners: Members of OECD Halden Project e.g.: EDF France, NRC USA, Vuje Slovakia, VTT Finland etc.

OTHER MERITS RELEVANT TO THE PROJECT

Sirola, M., & Hulsund, J. E. (2021). *Machine-Learning Methods in Prognosis of Ageing Phenomena in Nuclear Power Plant Components*. International Journal of Computing, 20(1), 11-21.
<https://doi.org/10.47839/ijc.20.1.2086>

Braarud P.Ø., Bodal T, Hulsund J.E., et al. *An Investigation of Speech Features, Plant System Alarms, and Operator–System Interaction for the Classification of Operator Cognitive Workload During Dynamic Work*. Human Factors. October 2020. doi:10.1177/0018720820961730

Miki Sirola and John Einar Hulsund, *Data-analysis methods in detecting, visualizing and predicting nuclear power plant component ageing phenomena*, The 10th IEEE International Conference on Intelligent Data Acquisition and Advanced Computing, 18-21 September, 2019, Metz, France.

John Einar Hulsund and Miki Sirola. *Degradation Management at Nuclear Power Plants*, WCEAM – 2018: The 13th World Congress on Engineering Asset Management, 2018, Stavanger, Norway.

O. Saarela and J. E. Hulsund. *Lifetime Modeling of Equipment at Nuclear Power Plants*. 9th International Topical Meeting on Nuclear Plant Instrumentation, Control, and Human Machine Interface Technologies, NPIC&HMIT 2015, Charlotte USA.

O. Saarela, J. E. Hulsund, A. Taipale and M. Hegle. *Remaining useful life estimation for air filters at a nuclear power plant*. Second European Conference of the PHM Society. July 8-10, 2014, Nantes, France.

B. H. Nystad, G. Gola, J. E. Hulsund. *Lifetime models for remaining useful life estimation with randomly distributed failure thresholds*, The Annual European Conference of the Prognostics and Health Management Society (PHM), Dresden, Germany, July 03-05, 2012.

Nystad, B.H., Gola, G., Hulsund, J.E., Roverso, D. *Technical condition assessment and remaining useful life estimation of choke valves subject to erosion*. Annual Conference of the Prognostics and Health Management Society (PhM), Portland, Oregon, 2010

Antonio Expósito et al. *Development of a software tool for the analysis and verification of emergency operating procedures through the integrated simulation of plant and operators actions*, October 2007, Annals of Nuclear Energy 35 2008.

Antonio Expósito et al. *An Approach to incorporate the Operator Actions in the Simulation Accident Sequences*. Paper presented at the conference 'Nuclear Energy for New Europe 2004', Portoroz, Slovenia.

János Végh et al. *Development and installation of a new On-Line Plant Safety Monitoring System for the Paks VVER-440 Units*, 2000, International 'Conference Nuclear Energy in Central Europe 2000 Golf Hotel', Bled, Slovenia.

Curriculum vitae

PLEASE NOTE: All items marked with * must be completed.

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* ROLE IN THE PROJECT

Project manager ☐ Work package leader ☒
 Project partner ☒ Other (specify) ☐

* PERSONAL INFORMATION

*Family name, First name:	Bisio Rossella Elisabetta		
*Date of birth:	20.11.1963	*Sex: F	
*Nationality:	Italian		

* HIGHER EDUCATION/OTHER TRAINING

	Subjects/degree/	Name of institution, country
1988	Computer/Information Science Laurea	Universita' degli studi di Torino, facolta' di scienze matematiche, fisiche e naturali: Information Science,
2009	Human -Technologi-Organisationon course	University of Stavanger
2009	Bayesian Netwroks course	Hugin https://www.hugin.com/
2008	Prosjektledelse course	Prosjektforum/HiØ

* POSITIONS (academic, business, industry, public sector, national or international organisations)

Current Position

	Job title/name of employer/country
2017-	Senior Researcher, IFE, Norway

Previous positions held (list)

	Job title/name of employer/country
2000-2017	Researcher, IFE, Norway
1998-1999	Researcher, Stiftelsen Østfoldforskning, Norway
1988-1998	Researcher, Centro Studi e Laboratori Telecomunicazioni, Torino, Italy

PROJECT MANAGEMENT EXPERIENCE (if applicable)

	Project/topic/role in project/funding from
2021-	

EXPERIENCE FROM RELEVANT RESEARCH & INNOVATION ACTIVITIES (if applicable)

	Project/type of R&I activity and R&I content /role and tasks/funding from
2021-	Adding Natural Language Processing Capabilities to smart systems Team member IFE Strategic program
2021-	Perceived Risk and Trust in Embedded AI Team member IFE Strategic program
2020-2020	Safety culture, building a support system for effective support in managing safety related cases in a nuclear power plant. Main role in capturing requirements and design a user friendly system.
2018-2019	SMACS: Sensemaking in A. Safety Critical situation, Responsible for work package for understanding the role of Human system interfaces in sensemaking NFR
2015-2016	IO-EPO: Integrated operation for the emergency preparedness organisation. Team member. NFR

EXPERIENCE FROM NATIONAL/INTERNATIONAL COLLABORATION/NETWORKING (if applicable)

	Activity or project / tasks and responsibilities / context/programme/framework of the collaboration and names of key partners (companies, institutions)
2021-	Effects of adaptive automation on the operator in future nuclear plants Project leader HRP project
2021-	Event investigation: the added perspective of success Team member HRP project
2018-	Human Performance Repository: Building a repository for human performance studies, findings and data ,for speeding up sharing and discovery of findings. Main role for requirement identification, technology evaluation, design of the architecture in particular design of the information structure (ontology) Partial implementation using WEB stack technology HRP project
2019-2020	Operator reliability in actions outside the control room (nuclear power plant). The goal was to evaluate new methods for collecting data for the evaluation of human reliability of the field operator in nuclear power plant Team member HRP project
2015-2016	LESUN Learning from Successes in Nuclear Power Plant Operation to Enhance Organisational Resilience. Team member NKS: Nordic Nuclear Safety research (http://www.nks.org/)
2014-2015	HUMAX: analysis of the experience of human performance tools for maintenance of a nuclear power plant Team member NKS: Nordic Nuclear Safety research (http://www.nks.org/)

OTHER MERITS RELEVANT TO THE PROJECT

- Publications, technical reports, peer-review assignments, etc.
- Presentations at workshops or conferences (national/international level)
- Positions in professional associations / networks

- “A Framework to Analyze Human Performance Outside the Control Room» Rossella Bisio, Alexandra Fernandes and Claire Blackett. Proceedings of the 30th European Safety and Reliability Conference and the 15th Probabilistic Safety Assessment and Management ESREL2020 PSAM 15
- «Operator Actions Outside the Control Room: A Field Study» Alexandra Fernandes¹, Rossella Bisio¹ and Claire Blackett, HCI International 2020
- “Human Machine Interfaces to support sensemaking in critical situations” Rossella Bisio, Andreas Bye, Lars Hurlen. Proceedings of the 29th European Safety and Reliability Conference, ESREL 2019
- Modelling organizational learning from successes in the nuclear industry: Staff meetings as forums of knowledge sharing and acquisition. In Poised to Adapt: Enacting resilience potential through desing, governance and organization: Proceedings, 7th REA Symposium (pp. 176-182) <http://www.resilience-engineering-association.org/wp-content/uploads/2018/06/REA-Proceedings-Final-Version.pdf>
- Viitanen, K., Koskinen, H., Skjerve, A. B., Axelsson, C., Bisio, R., & Liinasuo, M. (2017).
- IFE rapport F-2014/1617 – IO EPO phase -2 toward an emergency Organisation for handling the Unexpected. R. Bisio
- Human performance tools in nuclear power plant maintenance activities - Final report of HUMAX project. NKS-328 http://www.nks.org/en/documents_test/view_document.htm?id=111010212741803
- Learning from Successes in Nuclear Power Plant Operation - Intermediate Report from the NKS-R LESUN. NKS-354 http://www.nks.org/en/nks_reports/view_document.htm?id=111010213330253
- “Nødnett I norske kommuner. Erfaringer fra de første fasene” Rapport 2014 NTNU Samfunnforskning. Tilset, Fagerholt, Almlov, Bisio og Reegård
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Curriculum vitae

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* ROLE IN THE PROJECT

Project manager ☐ Work package leader ☒
 Project partner ☐ Other (specify) ☐

* PERSONAL INFORMATION

*Family name, First name:	Riegler, Michael Alexander		
*Date of birth:	18.09.1984	*Sex:	Male
*Nationality:	Austrian		

* HIGHER EDUCATION/OTHER TRAINING

	Subjects/degree/	Name of institution, country
2017	<i>Dr. Scient (PhD)</i>	<i>Department of Informatics, University of Oslo, NO (submitted 12 months ahead of schedule)</i>
2014	<i>Magister (Mag.)</i>	<i>Department of Informatics and Department of Economics, University of Klagenfurt, AT</i>

* POSITIONS (academic, business, industry, public sector, national or international organisations)

Current Position

	Job title/name of employer/country
2019-	<i>Chief Research Scientist, SimulaMet - Simula Metropolitan Center for Digital Engineering, NO</i>

Previous positions held (list)

	Job title/name of employer/country
2019-2020	<i>Adjunct Associate Professor, Kristiania University College, NO</i>

2018-2019	Senior Research Scientist, SimulaMet- Simula Metropolitan Center for Digital Engineering, NO
2017-2018	Research Scientist, Simula Research Laboratory, NO
2014-2017	PhD Student, Simula Research Laboratory, NO
2014	Research Staff Member, Department of, University of Klagenfurt, AT

PROJECT MANAGEMENT EXPERIENCE (if applicable)

	Project/topic/role in project/funding from
2021-2026	Interview training of child-welfare and law-enforcement professionals interviewing maltreated children supported via artificial avatars (Researcher, CRN Fripro, 12MNOK)
2019-2024	<u>ReproAI</u> (Researcher, CRN FRIMEDBIO, Improved assisted human reproduction technology using AI, 12MNOK)
2016	<u>DigSys</u> (Researcher, CRN pre-project, Non-Invasive, Scalable Automatic Screening of the GI System, 500KNOK)
2014-2017	<u>EONS</u> (Researcher, CRN FRINATEK, Efficient Execution of Large Workloads on Elastic Resources, 12MNOK)
2017-2020	<u>PRIVATON</u> (Researcher, CRN, Protecting Shared Data with Privacy Automats, 12MNOK)
2018-2023	<u>PACER</u> (Researcher, CRN, Patient-Centric Engineering in Rehabilitation, 12MNOK)

EXPERIENCE FROM RELEVANT RESEARCH & INNOVATION ACTIVITIES (if applicable)

	Project/type of R&I activity and R&I content /role and tasks/funding from
2018-2020	<u>AutoCap</u> (Researcher, CRN BIA, Automatic Anomaly Detection in Video Capsule Endoscopy, 12MNOK)
2018	<u>GastroEye</u> (Researcher, Italian, GI video capsule analysis, 700KNOK)
2017-2019	<u>INTROMAT</u> (Researcher, CRN Lighthouse, INTROducing Mental health through Adaptive Technology, 72MNOK)

EXPERIENCE FROM NATIONAL/INTERNATIONAL COLLABORATION/NETWORKING (if applicable)

	Activity or project / tasks and responsibilities / context/programme/framework of the collaboration and names of key partners (companies, institutions)
2014-	Multimedial Workshop organization, Different roles, University of Delft, Netherlands

OTHER MERITS RELEVANT TO THE PROJECT

My research interests include machine learning, multimedia and distributed systems. In particular, my experience cover machine learning with a focus on deep learning and system performance.

Total number of publications (journals, peer-review conferences): ~219

Google Scholar https://scholar.google.no/citations?user=Vd_ApDoAAAAJ&hl=en

Number of citations: 2298, h-index: 26, i10-index: 60

Curriculum vitae – Pål Halvorsen

* ROLE IN THE PROJECT

Project manager ☐ Work package leader ☒
 Project partner ☐ Other (specify) ☐

* PERSONAL INFORMATION

*Family name, First name:	Halvorsen, Pål		
*Date of birth:	26.12.1971	*Sex:	Male
*Nationality:	Norwegian		

* HIGHER EDUCATION/OTHER TRAINING

	Subjects/degree/	Name of institution, country
2001	<i>Dr. Scient (PhD)</i>	<i>Department of Informatics, University of Oslo, NO (6 months ahead of schedule)</i>
1997	<i>Cand.Scient (MSc)</i>	<i>Department of Informatics, University of Oslo, NO</i>

* POSITIONS (academic, business, industry, public sector, national or international organisations)

Current Position(s)

	Job title/name of employer/country
2018-	<i>Head of Department / Chief Research Scientist, SimulaMet - Simula Metropolitan Center for Digital Engineering, NO</i>
2019-	<i>Professor, Department of Informatics, OsloMet – Oslo Metropolitan University, NO</i>
2019-	<i>Professor II, Department of Informatics, University of Oslo, NO</i>
2016-	<i>CEO Forzasys AS, NO</i>

Previous positions held (list)

	Job title/name of employer/country
2005-18	<i>Chief Research Scientist, Simula Research Laboratory, NO</i>
2009-18	<i>Professor, Department of Informatics, University of Oslo, NO</i>
2002-09	<i>Associate Professor, Department of Informatics, University of Oslo, NO</i>

PROJECT MANAGEMENT EXPERIENCE (since 2014)

	Project/topic/role in project/funding from
2021-24	<u>AVATAR</u> (RESEARCHER, RCN Fripro, Interview training of child-welfare and law-enforcement professionals interviewing maltreated children supported via artificial avatars)
2020-22	<u>FFC</u> (RESEARCHER, Tromsø Research Foundation, Future Female Football Center)
2018-20	<u>AutoCap</u> (PROJECT LEADER, RCN BIA, Automatic Anomaly Detection in Video Capsule Endoscopy)
2019-20	<u>GIRD</u> (RESEARCHER, RCN FORNY, Gastro-Intestinal Real-time Detection)
2016	<u>DigSys</u> (PROJECT LEADER, RCN pre-project, Non-Invasive, Scalable Automatic Screening of the GI System)
2015-16	<u>VUE</u> (PROJECT LEADER, RCN FORNY, Video system for User Engagement based on in-video metadata, sport case study)
2014-17	<u>EONS</u> (PROJECT LEADER, RCN FRINATEK, Efficient Execution of Large Workloads on Elastic Resources)
2007-14	<u>iAd</u> (PROJECT LEADER@UiO, RCN SFI, Information Access Disruptions)
2017-20	<u>PRIVATON</u> (RESEARCHER, RCN, Protecting Shared Data with Privacy Automations)
2018	<u>GastroEye</u> (RESEARCHER, Italian, GI video capsule analysis)
2016-19	<u>TACS</u> (RESEARCHER, RCN, Trans-Atlantic Corpore Sano)
2015-	<u>Corpore Sano</u> (RESEARCHER, own financing, virtual research centre, distributed systems)
2014-17	<u>Unified PCIe IO</u> (RESEARCHER, RCN BIA, Unified PCI Express for Distributed Component Virtualization)
2012-15	<u>TimeIn</u> (RESEARCHER, RCN, Traffic behaviour of interactive time-dependent thin streams on the modern Internet)
2012-15	<u>RITE</u> (RESEARCHER, EU, Reducing Internet Transport Latency)

EXPERIENCE FROM RELEVANT RESEARCH & INNOVATION ACTIVITIES (since 2014)

	Project/type of R&I activity and R&I content /role and tasks/funding from
2019-20	<u>GIRD</u> (RESEARCHER, RCN FORNY, Gastro-Intestinal Real-time Detection)

2014-17	<u>Unified PCIe IO</u> (RESEARCHER, RCN BIA , Unified PCI Express for Distributed Component Virtualization)
2015-16	<u>VUE</u> (PROJECT LEADER, RCN FORNY , Video system for User Engagement based on in-video metadata)
2018-20	<u>AutoCap</u> (PROJECT LEADER, RCN BIA , Automatic Anomaly Detection in Video Capsule Endoscopy)
2007-14	<u>iAd</u> (PROJECT LEADER@UiO, RCN SFI , Information Access Disruptions)

EXPERIENCE FROM NATIONAL/INTERNATIONAL COLLABORATION/NETWORKING (since 2014)

	Activity or project / tasks and responsibilities / context/programme/framework of the collaboration and names of key partners (companies, institutions)
2014 -	More than 50 TPC memberships, co-chair memberships, associate editorships for journals, etc. See full list: http://home.simula.no/~paalh/conferences.html

OTHER MERITS RELEVANT TO THE PROJECT

My research interests include multimedia and distributed systems, in particular, system performance, video analysis and delivery, sport and medical applications, machine/deep learning.

Total number of publications (journals, peer-review conferences): ~300

Full list at: <http://home.simula.no/~paalh/publications/>

According to Google Scholar (<https://scholar.google.no/citations?user=hru0ei0AAAAJ&hl=en>), I have about 4500 citations and an h-index of 33

10 selected publications (since 2019):

1. **"Using 3D Convolutional Neural Networks for Real-Time Detection of Soccer Events"**, Olav A. Nergård Rongved, Steven A. Hicks, Vajira Thambawita, Håkon K. Stensland, Evi Zouganeli, Dag Johansen, Cise Midoglu, Michael A. Riegler, and Pål Halvorsen, TO APPEAR in International Journal of Semantic Computing, 2021
2. **"Real-Time Detection of Events in Soccer Videos using 3D Convolutional Neural Networks"**, Olav A. Nergård Rongved, Steven A. Hicks, Vajira Thambawita, Håkon K. Stensland, Evi Zouganeli, Dag Johansen, Michael A. Riegler, and Pål Halvorsen, Proceeding of the IEEE International Symposium of Multimeida (ISM), 2020
3. **"HyperKvasir, a comprehensive multi-class imageand video dataset for gastrointestinal endoscopy"**, Hanna Borgli, Vajira Thambawita, Pia H. Smedsrud, Steven Hicks, Debesh Jha, Sigrun L. Eskeland, Kristin Ranheim Randel, Konstantin Pogorelov, Mathias Lux, Duc Tien Dang Nguyen, Dag Johansen, Carsten Griwodz, Hakon Stensland, Enrique Garcia-Cej, Peter T. Schmidt, Hugo Hammer, Michael A. Riegler, Pål Halvorsen, Thomas de Lange, Nature Scientifici, Data, 2020
4. **"Scalable Infrastructure for Efficient Real-Time Sports Analytics"**, Håvard Johansen, Dag Johansen, Tomas Kupka, Michael A. Riegler and Pål Halvorsen, Proceedings of Workshop on Action Modelling for Interaction and Analysis in Smart Sports and Physical Education (MAISroPE), 2020

5. **"Machine Learning-Based Analysis of Sperm Videos and Participant Data for Male Fertility Prediction"**, Steven A. Hicks, Jorunn M. Andersen, Oliwia Witczak, Vajira Thambawita, Pål Halvorsen, Hugo L. Hammer, Trine B. Haugen, Michael A. Riegler, Nature Scientific Reports, Volume 9, Article number 16770, November 2019
6. **"An Extensive Study on Cross-Dataset Bias and Evaluation Metrics Interpretation for Machine Learning Applied to Gastrointestinal Tract Abnormality Classification"**, Vajira Thambawita, Debesh Jha, Hugo Hammer, Håvard D. Johansen, Dag Johansen, Pål Halvorsen, Michael Riegler, ACM Transactions on Computing for Healthcare, Article no.: 17, June 2020
7. **"Deep Learning for Automatic Generation of Endoscopy Reports"**, Steven Hicks, Pia H. Smedsrud, Michael A. Riegler, Thomas de Lange, Andreas Petlund, Sigrun L. Eskeland, Konstantin Pogorelov, Peter T. Schmidt, Pål Halvorsen, Gastrointestinal Endoscopy, Volume 89, Issue 6, Supplement, June 2019
8. **"Real-time Analysis of Physical Performance Parameters in Elite Soccer"**, Kim Andreassen, Dag Johansen, Håvard Johansen, Ivan Baptista, Svein A. Pettersen, Michael Riegler, Pål Halvorsen, Proceedings of the ACM International Workshop on Content-Based Multimedia Indexing (CBMI), Dublin, Ireland, September 2019
9. **"Efficient Live and On-Demand Tiled HEVC 360 VR Video Streaming"**, Mattis Jeppsson, Håvard N. Espeland, Tomas Kupka, Ragnar Langseth, Andreas Petlund, Peng Qiaoqiao, Chuansong Xue, Dag Johansen, Konstantin Pogorelov, Håkon Stensland, Carsten Griwodz, Michael Riegler, Pål Halvorsen, International Journal of Semantic Computing Vol. 13, No. 3, 2019
10. **"Summarizing E-Sports Matches and Tournaments - The Example of Counter-Strike: Global Offensive"**, Mathias Lux, Pål Halvorsen, Duc-Tien Dang-Nguyen, Håkon K. Stensland, Manjo Kesavulu, Martin Potthast, Michael Riegler, Proceedings of International Workshop on Immersive Mixed and Virtual Environment Systems (MMVE), Amherst, MA, USA, June 2019

Company creation:

- 2018: Co-founder Orca Labs AS - <https://www.orcalabs.no>
- 2018: Co-founder Augere Medical AS - <https://augere.md>
- 2014: Co-founder Forzasys AS - <https://forzasys.com>

Granted Patents:

"Data segmentation, request and transfer method", Dominik Kaspar, Kristian R. Evensen, Paal E. Engelstad, Audun F. Hansen, Carsten Griwodz, Pål Halvorsen, US 20110213827

Selected awards:

- IEEE ISM 2018 Best paper award
- MediaEval 2018 Distinctive Mention award
- IEEE CBMS 2018 Best paper award
- IFI@UiO Very good course 2010: INF5071
- NPC 2009 Best Student Paper Award
- IFI@UiO Extraordinary good course 2009: INF5063
- IFI@UiO Best Lecturer Award 2007
- LCN 2006 Best Paper Award
- NOSSDAV 2006 Best Paper Award

Curriculum vitae

* ROLE IN THE PROJECT

Project manager ☒ Work package leader ☐
 Project partner ☐ Other (specify) ☐

* PERSONAL INFORMATION

*Family name, First name:	Funke, Simon		
*Date of birth:	17.10.1983	*Sex:	Male
*Nationality:	German		

* HIGHER EDUCATION/OTHER TRAINING

	Subjects, degree	Name of institution, country
2004-2009	Applied Mathematics and Computer Science, Master	Technical University of Munich, Germany
2009-2013	Applied Mathematics, PhD	Imperial College London, UK

* POSITIONS (academic, business, industry, public sector, national or international organisations)

Current Position

	Job title, name of employer, country
2020-	CTO, Future Ready AS, Norway
2019-	Research Director, Simula Research Laboratory AS (Simula), Norway
2015-	Senior Research Scientist, Simula, Norway
2011-	CTO, RedHotRails LLP, UK

Previous positions held (list)

	Job title/name of employer/country
2018-2019	Head of Department for Numerical Analysis and Scientific Computing, Simula, Norway
2015-2017	Adjoint Associated Professor, University of Oslo, Norway
2013-2015	PostDoc, Simula Research Laboratory & Imperial College London, Norway
2014-2015	Consultant, Kalkulo AS, Norway

2013-2014	Consultant, E.ON AG, Germany
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PROJECT MANAGEMENT EXPERIENCE

	Project/topic/role in project/funding from
2020-2023	RCN Research Project “Data-driven models for physical simulations” (#303362), 12 MNOK, PI. This project aims to improve computer based physical simulations through data-driven machine learning.
2019-2023	RCN IKTPLUSS Project “SciML - Scientific computing and machine learning”, 12 MNOK, Co-PI. This project aims to bridge technologies from scientific computing and machine learning.
2016-2019	RCN FRIPRO Young Research Talent, “Simulation-based optimisation with dynamic domains” (#251237), 7 MNOK, PI. This project developed numerical methods for physical simulations in complex, time-varying geometries.
2015	EU Horizon SME instrument, IMERSO AS, Partner. Innovation project developing a 3D scanning solution for the construction industry.

EXPERIENCE FROM RELEVANT RESEARCH & INNOVATION ACTIVITIES

	Project/type of R&I activity and R&I content /role and tasks/funding from
2020-2023	RCN Research Project “Data-driven models for physical simulations” (#303362), 12 MNOK. Project leader and researcher
2019-2023	RCN IKTPLUSS Project “SciML - Scientific computing and machine learning”, 12 MNOK. Researcher
2016-2019	RCN FRIPRO Young Research Talent, “Simulation-based optimisation with dynamic domains” (#251237), 7 MNOK, Project leader and researcher

EXPERIENCE FROM NATIONAL/INTERNATIONAL COLLABORATION/NETWORKING

	Activity or project / tasks and responsibilities / context/programme/framework of the collaboration and names of key partners (companies, institutions)
2021-2023	RCN IS-DAAD, “Optimal shape design for cardiovascular flows” (#320753). Leading a networking project to increase the scientific collaboration between Humboldt University of Berlin, Germany, Weierstrass Institute, Germany, and Simula Research Laboratory, Norway. Project leader and researcher.

SELECTED AWARDS AND PRIZES

2019	Transdisciplinary publication of the year by the Center for digital life Norway. For the paper "Toward Personalized Computer Simulation of Breast Cancer Treatment: A Multiscale Pharmacokinetic and Pharmacodynamic Model Informed by Multitype Patient Data".
2015	Wilkinson Prize for Numerical Software. The Wilkinson prize for Numerical Software is a prestigious prize in scientific computing, awarded every four years to the authors of an outstanding piece of numerical software.
2013-today	Two best poster awards at international conferences, one from the largest conference in scientific computing. 6+ awards as part of winning hackathon teams, including one being featured by the BBC.
2013	Imperial College Startup Venture Catalyst Award. Awarded for the development of an innovative software solution that determines the optimal layout of large turbine farms.
2009	Hurwitz-Association Award for an outstanding master thesis.

MOBILITY

Studied and worked in research institutions in Germany, France, UK and Norway (> 6 months).

Shorter research visits:

- Heidelberg Laureate Forum, Germany (2016)
- Texas A&M University, USA (2015)
- Humboldt University of Berlin, Germany (2013)
- Simula Research Laboratory, Norway (2012)
- Isaac Newton Institute, Cambridge, UK (2012)
- Institut of Atmospheric Physics, Beijing, China (2011).

TEACHING ACTIVITIES

2015 - today	Lecturer, INF3331/INF4331 Higher-level programming, University of Oslo, Norway. The course has grown from ca 150 students to over 300 students since 2015.
2017	Python Workshop NTNU Trondheim (2017, 2 days).
2014-2016	FEniCS/dolfin-adjoint Workshops in UNISA Johannesburg (2016, 1 day), Technical University of Munich (2016, 5 days), SUURPH workshop, Simula (2016, 1 day), Simula (2016, 2 days), Simula (2014, 1 day), Zhejiang University (2014, 5 days).

COMMISSION OF TRUST

Reviewer for a series of high-profile scientific journals, including SIAM Journal on Scientific Computing (SIAM), Computer Physics Communications (Elsevier), Energies (MDPI) and European Wave and Tidal Energy Conference Series and Geoscientific Model Development (GMD), Applied Energy.

COMPANY CREATION

2011	RedHotRails LLT (www.alacalc.com), Co-Founder
2014	Imerso AS (www.imerso.com), Co-Founder

GRANTED PATENTS

Apparatus and method for global optimization MM Noack, SW Funke US Patent 9,990,714

BOOKS

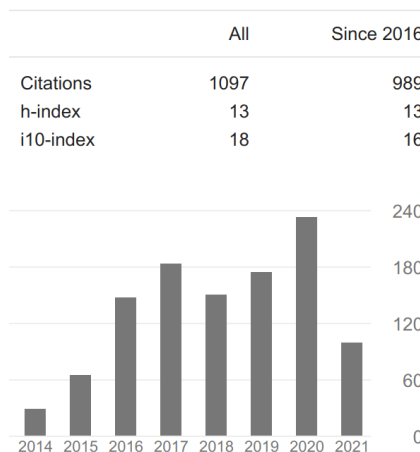
T Schwedes, DA Ham, SW Funke, MD Piggott. Mesh dependence in PDE-constrained optimisation - An Application in Tidal Turbine Array Layouts, Springer Research Brief , ISBN 978-3-319-59483-5, 2017.

PUBLICATIONS

Selection of 5 publications:

- Hybrid FEM-NN models: Combining artificial neural networks with the finite element method, SK Mitusch, SW Funke, M Kuchta, 2021 (in review)
- J. S. Dokken, A. Johansson, A. Massing, S. W. Funke. *A multimesh finite element method for the Navier-Stokes equations based on projection methods*, Computer Methods in Applied Mechanics and Engineering, 2020.
- X Lai, OM Geier, T Fleischer, Ø Garred, E Borgen, SW Funke, S Kumar, M Zucknick, ME Rognes, T Seierstad, A-L Børresen-Dale, VN Kristensen, L Engebraaten, A Köhn-Luque, A Frigessi. *Towards the personalized computer simulation of breast cancer treatment: pharmacodynamic model informed by multi-source patient data, a multi-scale pharmacokinetic and pharmacodynamic model informed by multi-source patient data*, Cancer Research, 2019
- SW Funke, PE Farrell, MD Piggott, *Tidal turbine array optimisation using the adjoint approach*, Renewable Energy 63, 658-673
- PE Farrell, DA Ham, SW Funke, ME Rognes. Automated derivation of the adjoint of high-level transient finite element programs, SIAM Journal on Scientific Computing, 2013.

Cited by



Attachment to grant application for an Innovation Project for the Industrial Sector. Project title:
Next Generation Immersive Learning (NGIM)

Information about applicant and partner companies

Complete one form per company – forms may be saved together as a composite document in pdf-format.

A form must be filled in for each of the following:

- Project Owner (the company serving as the formal applicant);
- All other companies listed as partners in the project description.

Formal requirements

The form “Information about applicant and partner companies” is not to exceed two pages (delete the instructions if necessary). The page format must be portrait A4 with 2-cm margins, single spacing, and 11-point font in Arial, Calibri or Times New Roman (as used here). It is permitted to use 9-point font for references and figure text.

Company name:	Consort AS		
Enterprise no.:	994887203	Year established:	2010
Company website:	www.consort.no		

Key figures for most recent accounting year (all figures to be provided in NOK million). Specify year for the accounts (FTE= Full time equivalents):			
No. of employees:	100	No. of FTEs performed by own employees:	
No. of R&D personnel:		No. of R&D FTEs performed by own employees:	
Annual turnover:		36.461.000 NOK	
Balance sheet total:		4.678.000 NOK	
Earnings:		3.641.000 NOK	
Total R&D expenditures:			
Information about ownership:			
Do one or more enterprises hold an ownership interest of 25% or more in the company? (Yes/No)		Yes	
Does the company hold an ownership interest of 25% or more in one or more enterprises? (Yes/No)		Yes	
Is the company part of larger concern? (Yes/No) If so, provide the name of the concern:		No	
Contact person for annual report/annual accounts and further information about the company:			
Name and email address of contact person:		Kristoffer Møller Rørvik // kristoffer@consort.no	

Briefly describe the following:

- Consort was established in 2010, with branches in Trondheim and Oslo. The company provides consulting services, TM services, rental of consultants, field salesmen, live chat and sales courses to partners in the Nordic region. With a leadership of 11 people, we are a total of 120 employees in their departments. All employees have a fixed salary that ensures a unique sharing culture across teams and allows us to retain skilled people over time. Services are:

Attachment to grant application for an Innovation Project for the Industrial Sector. Project title:
Next Generation Immersive Learning (NGIM)

booking: sales activities, loyalty calls, welcome calls, market research, consent linked to GDPR, customer service and live chat.

- Consort is going to implement the conversation engine as part of their learning and development strategy. The company has a goal of providing improved sales and customer service.
- Consort will provide specialist expertise on sales and customer service. In addition, they will try the outcomes from the different work packages and provide valuable feedback. Consort provides access to
- Consort will contribute to the value creation in the project by testing the solution on many different use cases like sales and customer service. In addition we will aim for Consort to have a commercial agreement with Future Ready. This will provide substantial revenue at 1000kr per user.

Attachment to grant application for an Innovation Project for the Industrial Sector. Project title:
Next Generation Immersive Learning (NGIM)

Information about applicant and partner companies

Complete one form per company – forms may be saved together as a composite document in pdf-format.

A form must be filled in for each of the following:

- Project Owner (the company serving as the formal applicant);
- All other companies listed as partners in the project description.

Formal requirements

The form “Information about applicant and partner companies” is not to exceed two pages (delete the instructions if necessary). The page format must be portrait A4 with 2-cm margins, single spacing, and 11-point font in Arial, Calibri or Times New Roman (as used here). It is permitted to use 9-point font for references and figure text.

Company name:	Future Ready AS		
Enterprise no.:	920845932	Year established:	2018
Company website:	www.futureready.no		

Key figures for most recent accounting year (all figures to be provided in NOK million). Specify year for the accounts (FTE= Full time equivalents):			
No. of employees:	9	No. of FTEs performed by own employees:	9
No. of R&D personnel:	4	No. of R&D FTEs performed by own employees:	4
Annual turnover:		1,3 (2020)	
Balance sheet total:		2,0	
Earnings:		-0,382	
Total R&D expenditures:		0,693	
Information about ownership:			
Do one or more enterprises hold an ownership interest of 25% or more in the company? (Yes/No)		YES	
Does the company hold an ownership interest of 25% or more in one or more enterprises? (Yes/No)		NO	
Is the company part of larger concern? (Yes/No) If so, provide the name of the concern:		NO	
Contact person for annual report/annual accounts and further information about the company:			
Name and email address of contact person:		Lars Kolflaath lars@futureready.no	

Briefly describe the following:

- Future Ready work with companies in finance, media and telecom to help improve their outbound sales and customer service. We improve people's skills in telemarketing and customer service. We achieve this by using smart technology like language and voice analysis to make practicing skills effective and systematic
- In this project we address the problem that one quarter of all working people in Norway have to deal with customers as a part of their job. Whether it is customer service centers, telemarketing or emergency helplines, it is all part of a growing service-industry both

Attachment to grant application for an Innovation Project for the Industrial Sector. Project title:
Next Generation Immersive Learning (NGIM)

nationally and internationally. The project's goal - developing an empirically informed training system using realistic and context aware conversation engines to enable sales and service representatives to develop and maintain the advanced skills needed to be successful - is both ambitious and novel

- The project will be led by Simon Funke, PhD. Simon heads up Future Ready's research team and is also its CTO. He holds a PhD in mathematics and modelling from Imperial College London and brings a wealth of experience as a Research Director with Simula and leader of a 40 plus strong research team. Future Ready oversees and ensures the overall progress of the project. Further, Future Ready will act as a link between the commercial and research partners. Each R&D partner is responsible for one or more WPs. The responsible partner organises regular meetings between the participating partners of the WP, and ensures the progress of all tasks within the WP. Future Ready will organise a kick-off, as well as annual project meetings, where all partners present their progress and share their experiences. The project manager has been chosen based on his extensive previous experience from managing research as well as industrial consultancy projects.
- The potential for value creation with Conversational AI is huge. The market is currently around \$4.8B in a rapidly expanding market with over 21% CAGR growth over the next four years. As a SaaS company, we will employ a license-based business model where customers pay for our services per user and month. We estimate that given the value we create with the conversational engine we will be able to charge 1000 NOK per user per month. Assuming an average of 50 users per customer we are looking at potential annual recurring revenue per customer of 600 kNOK. Our business model is highly scalable and assuming a positive outcome in the proposed innovation project Future Ready will be well positioned for exponential growth in the coming years. For our pilot customers participating in the project, Consort, Headshed and Telia, there is significant potential for value creation in optimising training of employees, cost reduction and increased sales. Finally, note that even though our initial customers target sales training, the technology is transferable to the customer service sector in general as well as smart cities, hence greatly increasing the future value creation of the project.

Attachment to grant application for an Innovation Project for the Industrial Sector. Project title:
Next Generation Immersive Learning (NGIM)

Information about applicant and partner companies

Complete one form per company – forms may be saved together as a composite document in pdf-format.

A form must be filled in for each of the following:

- Project Owner (the company serving as the formal applicant);
- All other companies listed as partners in the project description.

Formal requirements

The form “Information about applicant and partner companies” is not to exceed two pages (delete the instructions if necessary). The page format must be portrait A4 with 2-cm margins, single spacing, and 11-point font in Arial, Calibri or Times New Roman (as used here). It is permitted to use 9-point font for references and figure text.

Company name:	Headshed AS		
Enterprise no.:	912 976 041	Year established:	2013
Company website:	www.headshed .com		

Key figures for most recent accounting year (all figures to be provided in NOK million). Specify year for the accounts (FTE= Full time equivalents):			
No. of employees:	5	No. of FTEs performed by own employees:	5
No. of R&D personnel:	4	No. of R&D FTEs performed by own employees:	4
Annual turnover:			4,1M
Balance sheet total:			8,5M
Earnings:			-1,2M
Total R&D expenditures:			2,7M
Information about ownership:			
Do one or more enterprises hold an ownership interest of 25% or more in the company? (Yes/No)			YES
Does the company hold an ownership interest of 25% or more in one or more enterprises? (Yes/No)			NO
Is the company part of larger concern? (Yes/No) If so, provide the name of the concern:			NO
Contact person for annual report/annual accounts and further information about the company:			
Name and email address of contact person:		Torbjørn Slørdal torbjorn.slordal@headshed.com	

Briefly describe the following:

- Headshed is a startup with a healthy clientbase using their CRM system across Norway. Headshed makes it easier and more efficient to stay in touch with customers on a daily basis.
- Headshed is going to implement the conversation engine into their system. Helping their customers provide improved sales and customer service.
- Headshed will provide specialist expertise on sales and customer service. In addition, they will try the outcomes from the different work packages and provide valuable feedback.

Attachment to grant application for an Innovation Project for the Industrial Sector. Project title:
Next Generation Immersive Learning (NGIM)

- Headshed will contribute to the value creation in the project by introducing us to new customers and the goal is that we will have a commercial agreement with Headshed. This will provide revenue and be part of a future business model where Headshed's current customers get access to the solution we build and we get a share of the revenue. This will provide substantial revenue at 1000kr per user.

Attachment to grant application for an Innovation Project for the Industrial Sector. Project title:
Next Generation Immersive Learning (NGIM)

Information about applicant and partner companies

Complete one form per company – forms may be saved together as a composite document in pdf-format.

A form must be filled in for each of the following:

- Project Owner (the company serving as the formal applicant);
- All other companies listed as partners in the project description.

Formal requirements

The form “Information about applicant and partner companies” is not to exceed two pages (delete the instructions if necessary). The page format must be portrait A4 with 2-cm margins, single spacing, and 11-point font in Arial, Calibri or Times New Roman (as used here). It is permitted to use 9-point font for references and figure text.

Company name:	Institutt for energiteknikk (IFE)		
Enterprise no.:	959 432 538	Year established:	1953
Company website:	www.ife.no		

Key figures for the most recent accounting year (all figures to be provided in NOK million). Specify year for the accounts (FTE= Full time equivalents):			
No. of employees:	623	No. of FTEs performed by own employees:	623
No. of R&D personnel:	524	No. of R&D FTEs performed by own employees:	524
Annual turnover:		1.070.000.000	
Balance sheet total:		745.000.000	
Earnings:		47.000	
Total R&D expenditures:		1.023.000.000	
Information about ownership:			
Do one or more enterprises hold an ownership interest of 25% or more in the company? (Yes/No)			NO
Does the company hold an ownership interest of 25% or more in one or more enterprises? (Yes/No)			NO
Is the company part of larger concern? (Yes/No) If so, provide the name of the concern:			NO
Contact person for annual report/annual accounts and further information about the company:			
Name and email address of contact person:		Jonas Aamodt Moræus jonas.moraeus@ife.no	

Briefly describe the following:

- IFE is conducting research for a better future and develops innovative solutions that contribute to sustainable economic growth in Norway
- IFE will be an internationally leading R&D partner within the areas of energy, climate, the environment and digitalisation.
- IFE will conduct viable future-oriented research activities at a profit which is reinvested into research and infrastructure.

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- IFE will bolster the commercialisation of research in order to secure increased economic growth and enable the development of new knowledge businesses.

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Project title: Next Generation Immersive Learning (NGIM)

Information about applicant and partner companies

Company name:	Simula Metropolitan Center for Digital Engineering AS		
Enterprise no.:	920 203 612	Year established:	2018
Company website:	www.simulamet.no		

Key figures for most recent accounting year (all figures to be provided in NOK million). Specify year for the accounts (FTE= Full time equivalents):			
No. of employees:	59	No. of FTEs performed by own employees:	59
No. of R&D personnel:	47,5	No. of R&D FTEs performed by own employees:	47,5
Annual turnover:			72 170 kNOK
Balance sheet total:			45 536 kNOK
Earnings:			6 807 kNOK
Total R&D expenditures:			100 %
Information about ownership:			
Do one or more enterprises hold an ownership interest of 25% or more in the company? (Yes/No)			No
Does the company hold an ownership interest of 25% or more in one or more enterprises? (Yes/No)			No
Is the company part of larger concern? (Yes/No) If so, provide the name of the concern: Simula Research Laboratory AS			Yes
Contact person for annual report/annual accounts and further information about the company:			
Name and email address of contact person:		Monica Eriksen monica@simula.no	

Simula Metropolitan Center for Digital Engineering (SimulaMet) is a new research unit that is jointly owned by Simula Research Laboratory and OsloMet – Oslo Metropolitan University. It is the home of Simula's research activities on networks and communications, machine learning and IT management, and it is OsloMet's strategic partner in research and postgraduate education. SimulaMet is organized as a limited company.

Except for research itself, SimulaMet does not sell products, and thus, have not particular markets. The research center has its focus areas as listed above, but has no particular target application scenarios or customers. That said, the partner research department (Holistic Systems) has focus areas directly matching the proposal. The department has for a long time investigated AI-based systems in the areas of health, sports and environment studies – for real-world environments and users. In a collaboration with Forzasys, researchers from HOST have also initiated research in the area of soccer event detection and are applying novel AI analysis methods to the vast amount of data produced by soccer. Thus, the research department has a good position in the research community, having papers being cited, asked to organize workshops and competitions, and requests for collaborations.

SimulaMet's goals and objectives in the proposed project are to produce interesting and relevant research and generate ideas potentially being used by industry or society in general. This project targets a real-world open challenge, and the potential for impact is large. Thus, we seek interesting challenges and research problems, that can result in good published papers, student theses, and research prototypes, i.e., the value for our research department is the research, the prototypes, experiences and the resulting

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Project title: Next Generation Immersive Learning (NGIM)

papers that will strengthen our research profile and can be used further in our future research in AI, video analysis and sports in general. The proposal aims for procurement of time from SimulaMet researchers. We will involve our researchers in HOST already having the experience in the area of AI, sports and video analysis.

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- All other companies listed as partners in the project description.

Formal requirements

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Company name:	Telia Norge AS		
Enterprise no.:	981 929 055	Year established:	2000
Company website:	telia.no og phonero.no		

Key figures for most recent accounting year (all figures to be provided in NOK million). Specify year for the accounts (FTE= Full time equivalents):			
No. of employees:	2354	No. of FTEs performed by own employees:	2095
No. of R&D personnel:	190	No. of R&D FTEs performed by own employees:	190
Annual turnover:			13 781 Milliarder
Balance sheet total:			37 747 Milliarder
Earnings:			1 746 Milliarder
Total R&D expenditures:			152 Millioner
Information about ownership:			
Do one or more enterprises hold an ownership interest of 25% or more in the company? (Yes/No)			YES
Does the company hold an ownership interest of 25% or more in one or more enterprises? (Yes/No)			YES
Is the company part of larger concern? (Yes/No) If so, provide the name of the concern:			Telia AB
Contact person for annual report/annual accounts and further information about the company:			
Name and email address of contact person:		Bas Strang bas.strang@phonero.no	

Briefly describe the following:

- Telia is the second largest supplier of mobile services in Norway. Telia offers a complete range of services for business and consumers. We will be working closely with their provider for mobile services for business, Phonero.
- Telia is going to implement the conversation engine as part of their learning and development strategy. The company has a goal of providing improved sales and customer service.
- Telia will provide specialist expertise on sales and customer service. In addition, they will try the outcomes from the different work packages and provide valuable feedback.

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- Telia will contribute to the value creation in the project by introducing us to new customers in the Telia system. The goal is to have a commercial agreement with Telia. This will provide substantial revenue at 1000kr per user.