Centre of Excellence in Maritime Simulator Training and Assessment - COAST

Introduction

Norway possesses a long and rich maritime heritage. It is one of the world’s largest and most technologically advanced seafaring nations. The Norwegian maritime industry is knowledge intensive and contributes significantly to the national GDP, by employing 90,000 people and generating the value of 14.5 billion EUR per year. Norway is also the world’s fifth largest ship owning nation1. The country has a recognized standing in maritime research as well as substantial competence in maritime education and training (MET). **COAST (Centre Of Excellence in MAritime Simulator Training and Assessment)** is conceptualized to capitalize on this advantage and place Norway at the forefront in seafarer’s education. The objective of COAST is to equip students with necessary skills and knowledge to be able to excel in an evolving maritime industry.

Due to the continuous increase of automation and digitalization, the maritime industry is undergoing radical changes. Thus, the seafarers of today not only need to be proficient in advanced technical knowledge on the state-of-the-art equipment onboard, they also need to demonstrate creativity and divergent thinking2. However, the existing curriculum of Maritime Education & Training (MET) and the pertaining certification does not constitute perfect overlap with the ongoing practices3. There is also evidence regarding the shortcomings of decontextualized and unstandardized traditional training and assessment methods in MET, which fail to adequately address the need for skill development of present-day seafarers4,5,6. Moreover, studies show that assessment of professional competencies in MET fails to
meet the required standards of being valid, reliable and fair tests of student’s performance. These issues call for novel perspectives in seafarers’ education, and a paradigm shift is required from ongoing practices to facilitate the acquisition of both technical and non-technical skills. Technical skills refer to the formal competence requirements as laid down by the Standards of Training, Certification & Watchkeeping (STCW) convention for maritime industry, whereas the non-technical skills are the soft skills required to successfully perform tasks in team environments such as – communication, leadership, decision making, etc. Further, if MET is to match the technical advances of current digital training technology developments, there is a need for novel and standardized methods. Simulator training is the primary means for the maritime industry to train students and seafarers in complex maritime operations on account of their proven benefits. With these dynamics in mind, the vision and plans of COAST have been developed with the joint initiative of consortium management, students and industrial partners. The COAST consortium (see Fig.1) consists of the University of South-Eastern Norway (USN) as a leader, and The Western Norway University of Applied Sciences (HVL), The Norwegian University of Science and Technology (NTNU) and The Arctic University of Norway (UiT) as partners. Together, these institutions - along with relevant industrial partners (e.g. Kongsberg Digital) - aim to develop a centre of excellence for maritime simulator training and assessment. The consortium partners of COAST possess varied and complementary expertise. The areas of expertise of USN includes simulator training, maritime training and assessment, human factors, autonomous operations and systems safety. UiT possesses expertise in advanced Arctic operations, simulator training, big data and artificial intelligence in maritime operations. HVL has expertise in maritime safety, simulator training, human factors in design, human-machine interaction, MET, and maritime law. NTNU focuses on ship design, ocean engineering and simulator training.

The centre will prepare the maritime educational program for current and future demands in a maritime industry characterized by increased automation and digitalization. Through the integration of innovative simulator-based education, COAST will create an environment where active learning is fostered through student engagement and facilitated by instructors with high pedagogical skills. The COAST approach is to support educational innovation, with strong anchors in research and practice. The strategy for the centre is closely developed with MARKOM2020, a successful collaborative project on higher maritime professional education and the institutions in the consortium*. The consortium will develop, promote and disseminate student-centred simulator training and novel assessment practices in order to be at the forefront of development within MET.

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* Consortium refers to the 4 partners in the application – USN (lead), NTNU, UiT and HVL
**Documentation of educational quality in existing provisions**

**Input factors**

Since 2011 USN, HVL, NTNU and UiT have worked together as a consortium in the MARKOM2020 project. Vision for the project is “A Norwegian world class maritime education” and includes maritime education from upper secondary school to PhD. The achievements in the project have contributed significantly to quality development within maritime education, research and infrastructure. The steering group in MARKOM is led by the rector of USN and consist of members from the leadership of each of the four institutions. USN has approximately 18,000 students enrolled in several educational programs as well as 1,600 employees spread over 8 campuses. The department of maritime operations (IMA) belongs to the faculty of technology, natural sciences and maritime sciences and is situated at Campus Vestfold. All four institutions in the consortium are strategically located by the local maritime clusters, in close proximity to the complete spectrum of maritime services providers. In close cooperation with the industry, the consortium offer maritime education at Bachelor, Masters and PhD level. Two of the programs, the Bachelor in Maritime Management (adapted candidates from maritime upper secondary school) and PhD in Nautical Operations is offered in close cooperation among the four institutions.

Based on their excellent managerial competency and on NOKUT accredited quality system, the institutions are strongly engaged in supporting the educational brief. They have “state-of-the-art” simulator park which is used in research, exercises and training in standard maritime operations. These simulators provide the students with realistic training facilities as part of the education in the maritime programs. Additionally, the institutions possesses a variety of desk-top simulators to complement the theoretical aspects learned in the classrooms. USN currently possesses 10 Full mission simulators and 42 desktop simulators utilized in various courses and programs (see Fig. 2). HVL possesses 7 full mission simulator and 12 desktop simulators. NTNU has 6 full mission simulators and 31 desktop simulators whereas UiT possesses 3 full mission simulators and 9 desktop simulators.

In the past few years, USN has been focusing strongly on integrating research into education and student involvement. **1M EUR** has been invested in acquiring new simulators; since 2014, the maritime department at USN has published 25 articles on maritime simulator training and assessment. There are 3 ongoing PhD projects at USN, namely − “Development of assessment tool for seafarers’ performance in Nautical Operations”, “Computer supported collaborative learning as an intervention in Maritime

![Fig.2: Different simulators at USN Campus Vestfold](image_url)
Education & Training” and “Wearable Virtual Reality for maritime professional training”. Moreover, approximate funding of **7M EUR** has been allocated to various projects aiming at developing novel methods of training and assessment for maritime simulator-based education. The relevant projects lead by other consortium partners are summarized under the heading “Synergies with on-going projects”.

**Process factors**

The simulator teaching is informed by applied research. Various projects are being conducted to improve the assessment of the students’ learning processes and outcomes, to increase the students’ learning quality. Students engage in learning through structured discussions, briefing, debriefing and problem-based exercises in simulators. There are ongoing efforts to complement the traditional approaches through articulated interventions in learning sciences such as - computer supported collaborative learning/flipped classrooms/blended learning methodologies. Some of these pilot projects are master theses for the involved instructors who are continuously encouraged to develop their research portfolios and pedagogical competence.

The consortium partners collaborate closely with each other and the industry, in order to further develop and improve the maritime studies. All partners have an extensive global network with top maritime universities. Guest lectures from the industry, site-excursions and ship visits are integrated into the educational programs. For example, USN offers an international summer school for shipping companies. The instructors and researchers have contacts in the maritime industry (such as shipping companies, manufacturers, regulators, classification and rescue organizations, etc). The close cooperation between industry and academia also generates a number of apprenticeship opportunities for the enrolled students in Norwegian and International companies. Periodically the students invite industry representatives to present their organizations and give thematic talks (for e.g. events such as “Ship night” and “Career fair”). Further, many bachelor and master thesis projects are conducted in close collaboration with industry partners.

All partners have standard routines for collecting and following up feedback from the students. During simulator exercises, structured debriefing provides opportunities for students to give feedback. Further, there are mid and end-term course evaluations, which are compiled into program and faculty reports. At USN, a dedicated project has been undertaken to identify reasons for students leaving the program. The program plans are revised periodically on the basis of feedback from students and NOKUT.

The teaching community of all partners has competitive academic and pedagogical competence in simulator training. The instructors and researchers have undertaken pedagogical training for university programs (UH-PED level 1 and 2) to improve their formal competence. Further, all simulator instructors in relevant maritime programs have attended the IMO courses 6.09 and 6.10, as required by the Norwegian Maritime Authority.
Output factors

In the maritime programs, there is a 15% increase in the number of applicants in 2019 according to the Norwegian Universities and Colleges Admission Service. All the graduated maritime students of the consortium fulfill the international accreditations of STCW\textsuperscript{19} requirements (International Convention on Standards of Training, Certification and Watchkeeping for Seafarers’78 as Amended). According to feedback from the industry, the maritime candidates are competent and of high quality\textsuperscript{20,21}. The “study barometer” for USN, shows that it has received respectable results in some of the selected dimensions for the year of 2018\textsuperscript{22,23}. In areas of “instruction” and “learning environment”, USN has received index score level almost equal to that of national average; while in areas of “link to working life” and “inspiration”, USN sits higher than national index level in Bachelor programs of Nautical, Marine Engineering and Shipping logistics. USN simulator park facilitates professional seafarers with the latest simulators (full mission simulators, desktop, etc.) training them in proper usability of latest maritime technologies. NTNU’s simulator research facility “Norwegian Maritime Competence centre (NMK)” is one of the top ranked facilities in the world providing a testing arena for maritime companies for testing experimental dynamics which ensures any new methods are safe before being put into practice.

The institutions in this consortium have developed a close relation to simulator suppliers and the maritime industry. This collaboration is a driving force for innovation in maritime education and value creation for the industry. Therefore, the establishment of a centre of excellence in maritime simulator training and assessment (COAST) is in line with the consortium institutes, industry and government efforts.

Centre plan

The vision and mission of COAST are described as follows:

**Vision:** To be the world’s leading provider of simulator training and assessment for maritime education

**Mission:** To promote student-centred learning by innovative simulator-based education.

The centre will employ a series of strategies aimed at developing a culture of innovation that supports learning and which could sustain the outcomes even after the completion of the project. The students, along with instructors, researchers, alumni, academic and industrial partners will be involved in developing a “Community of learners” to apply and evaluate novel methods for training and assessment. This will be achieved by the following work packages (refer to Fig. 3):

**WP 1:** Synthesizing the existing state-of-the-art knowledge and common curriculum development

Lack of standardization and unavailability of benchmarks for training and assessing maritime students is one of the current challenges faced by maritime education providers. The COAST consortium aims to develop a common simulation curriculum for maritime students which can later be disseminated at international level. COAST will unite all the professional maritime educators in Norway by offering a unique opportunity to take advantage of each individual partner’s strength. Commonalities and
differences in maritime education approaches will be identified through an action research approach in a
dialogue between students, scientific advisory groups and reference groups, for the purpose of informing
the design of a common simulation curriculum. Further, practices and procedures employed by
different domains such as aviation, healthcare, space, transportation, oil & gas, etc will be analysed
through systematic literature reviews and document analysis, in order to create benchmarks for maritime
simulator education. WP1 will result in harmonizing the state-of-the-art knowledge regarding simulator
practices and common simulation curriculum for the maritime domain.

WP 2: Research and development of novel simulator training and assessment methods
MET is to a large extent built upon training in technologically mediated settings. WP2 addresses the
development of novel simulator training and assessment methods, taking technological advances into
account and integrating the existing pedagogical approaches. The centre will explore novel simulator
training methods, such as – Virtual, Augmented and Mixed Reality (VR/AR/MR), and custom “hybrid
reality” by merging of real and virtual worlds to produce new environments and visualizations integrated
with seafarers work environment. The centre will, therefore, develop new and objective methods to
assess the learning process in maritime simulators, where all new practices will be evaluated in formal
studies involving students. This includes investigating performance using different levels of automation,
different levels of simulator fidelity, and with different units of analysis (individual, dyads & group).
Current assessment practices will be evaluated to ensure relevant pedagogical approaches are integrated
with more focus on objective performance assessment and taxonomies to evaluate non-technical skills
will be developed. Practical scenarios will be developed in which students in multiple campuses are
trained jointly. WP2 will, therefore, constitute in the research progress related to maritime training and
assessment.
**WP 3: Inducing student engagement through active roles.**

Student engagement will be taken to a higher level, from the existing consultation role to partnership and leadership roles, and through the implementation of collective practices in WP3. Dedicated resources will be allocated for students to chart out the learning approaches to their own initiatives through peer learning approaches. Adequate infrastructure will be provided in the form of dedicated office spaces, VR/AR equipment and virtual-world laboratories. Students will be encouraged to visit the facilities at the partner’s institutions and beyond. The student advisory board (Think Factory) will be involved in decisions regarding future research directions by contributing their input during the idea formulation stages of research projects. The centre will employ experienced students to teach junior peers in different simulator exercises. The centre will further empower the student unions (see budget) in engaging with the industry and provide the opportunity to develop customized internship programs for students. After some active months in the industry, the recent graduates will be invited to share their experiences and reflections in workshops as part of an established alumni network. These experiences and reflections afford a rich learning opportunity for educators, researchers and especially students. WP3, therefore, focuses on promoting student engagement through active roles.

**WP 4: Institutional development**

Institutional development is the fourth pillar in the development of COAST. The instructors and researchers engaged in maritime simulators need to be trained for the purpose of increasing their competencies further and acquiring a diverse skill set. Arranged workshops, seminars and courses within WP4 will not only facilitate the institutional development but also facilitate engagement with cross-disciplinary platforms and spur innovation. The faculty members will be encouraged to undertake periodic exchange visits to other institutions to acquire new competencies and facilitate knowledge creation. A dedicated portion of the budget will be allocated for infrastructure development with regards to simulators. Finally, COAST will contribute to the overall institutional development of current activities and development of new activities at each member of the consortium as illustrated in Table 1.

<table>
<thead>
<tr>
<th>Consortium members</th>
<th>Current activities</th>
<th>Development of new activities</th>
</tr>
</thead>
</table>
| USN                | • 3 active PhD projects directed at developing novel methods for the training and the assessment of maritime simulator-based education.  
• Research Council of Norway (RCN) funded project aiming at developing Innovative maritime training simulators using virtual and augmented reality (InnoTraininn). | • Introduce VR training in bachelor of nautical science and marine engineering programs.  
• Increasing engagement of instructors in simulator research and PhD project.  
• Development of non-technical skills taxonomies for students in simulator exercises.  
• Continuing current proposals for follow up research - exercises, Bachelor’s and Master’s projects aimed |
The international partners of COAST – University of Central Florida (USA), Liverpool John Moores University (UK) and Chalmers University of Technology (Sweden) will further facilitate the internationalization and development of COAST.

**Organization**

The centre will be administered through an executive board connecting separate reference groups with the overall supervision of the steering committee. The executive board will comprise the scientific leader and a project coordinator. The proposed scientific leader Associate professor Salman Nazir has vast experience with academic and scientific management and faculty development at USN in accordance with the research focused strategic goals of the institution. The program leaders from partner universities, the students’ “Think Factory”, scientific advisory committee including international partners and the industry will form the reference groups (see Fig.4). The program councils in the reference group is comprised of subject teachers and instructors while the program leaders are the centre responsible from

<table>
<thead>
<tr>
<th>NTNU</th>
<th><strong>Requirements for UH-PED course for all instructors.</strong></th>
<th>at fostering the practical application of teaching and learning through modern simulator practices.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Use of Research Vessel Gunnerus as a training vessel in collaboration with NTNU.</td>
<td>Improved access to simulators for students round the clock.</td>
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<tr>
<td></td>
<td><strong>Formative Assessment in subjects related to simulators.</strong></td>
<td>Increased incorporation of STCW Part B topics into the curriculum of BSc program (DP, Ship handling, LNG, Polar Code Course).</td>
</tr>
<tr>
<td></td>
<td>Easy access to simulators for students.</td>
<td>Use of simulators for research activities with students as participants/subjects (BSc, MSc and PhD thesis).</td>
</tr>
<tr>
<td></td>
<td>Continuous training of student assistants.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use of labs and simulators of various fidelity in the Bachelor program</td>
<td></td>
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<tr>
<td><strong>NTNU</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>UIT</strong></td>
<td><strong>Practicing methods for students’ active learning through debriefing after simulator exercises.</strong></td>
<td>Increased collaboration between instructors across operative programmes (Nautical Sciences, Aviation and Drone).</td>
</tr>
<tr>
<td></td>
<td>Using proven methods for assessment of student performance.</td>
<td>Use of simulators for research activities.</td>
</tr>
<tr>
<td></td>
<td>Establishing programmes and arenas for continuous pedagogical training of staff.</td>
<td>Implementation and use of VR/AR simulators in tactical manoeuvring and navigation.</td>
</tr>
</tbody>
</table>

| **HVL** | **Access to simulators after scheduled hours. At present: a pilot study running for evening access, with trustee present.** | Expand simulator access to 24/7. Increase the availability of individual training. |
|     | Using traditional methods for debriefing and feedback. Students need increased mentor presence in simulators as well as personal feedback. | Integration of methods from other domains (aviation, health, etc.) and involving senior students and plan for one personal session per course. |
|     | | Utilise K connect (Kongsberg networking platform) for systemic simulation capabilities. Develop joint simulation scenarios connecting Norwegian simulators (internal and external), share exercises with partners, provide remote access. |
each of the consortium partners. The dedicated scientific advisory committee consists of vice-rector of education, USN and selected academic partners working within the area of human factors, training and education in maritime domain including Dr. Tareq Ahram from University of Central Florida, USA; Prof. Zaili Yang from Liverpool John Moores University, UK and Dr. Charlott Sellberg from Chalmers University of Technology, Sweden.

The key members (CV attached) of COAST comprises Associate Professor Salman Nazir from USN, a well-recognised researcher in human factor, training, education and assessment domain who is also leading several research projects (approx. 3M EUR) in Norway in the area of VR, training and performance assessment; Assistant Professor Astrid Camilla Wiig at USN with her expertise in training and pedagogy; PhD research fellow Amit Sharma at USN with his expertise in pedagogical intervention for maritime trainees focused on non-technical skill development; Professor Vegard Nergård at UiT with his expertise on human factors, pedagogy and learning; Associate professor Frøy Birte Bjørneseth at NTNU, specialist in human-machine interaction and Professor Margareta Lutzhoft at HVL, expert in maritime human factors. COAST is committed for equal gender representation and diversity in all levels of its organization as can be seen in the representation of key members.

Dissemination

COAST aims to become the world leading education centre in maritime simulator training and assessment by offering an innovative pedagogical arena, where students are empowered to take key roles in the future of the maritime industry and the centre acts as knowledge generation and information sharing hub. Therefore, the implementation of an open innovation strategy for research and development is necessary. Unlike centralized approaches to research, COAST embraces the widespread and open availability of knowledge and ideas to academia, industry and society. Such dissemination will guarantee
efficient communication within the project as well as outside with its stakeholders (students, teachers, scientists, policymakers and the general public) in order to raise awareness about the ongoing project and its outcomes at all levels.

**Dissemination tools**

The centre would employ the following methods of dissemination as illustrated in Table 2.

**Table 2: Dissemination plan**

<table>
<thead>
<tr>
<th>Tool</th>
<th>Mode</th>
<th>Centre resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>COAST website</td>
<td>It will provide information on the project, update the progress and results and be a gateway to other related research. It will share information to project partners as well as among different stakeholders including academia and the industry. Links to articles, social media and research publications, news and conference proceedings will be provided.</td>
<td>A new section could be opened in the already existing website domain of USN</td>
</tr>
<tr>
<td>COAST Brochure</td>
<td>Brochures with information about the project and the findings will provide a brief and visually attractive way to disseminate COAST to the broader audience. Brochures will be available in both web-based and printed formats.</td>
<td>COAST brochures will be developed with active help and recruitment of students.</td>
</tr>
<tr>
<td>Newsletters and website news</td>
<td>The aim of the newsletters is to keep the larger audience up-to-date about the progress of the project and its results and to serve as a channel to highlight the advancements, key results and publications from outside the COAST project with implications or relevance to COAST.</td>
<td>A quarterly newsletter with the help of the student advisory board will be disseminated to the relevant audience with e-version posted on the website.</td>
</tr>
<tr>
<td>Workshops and meetings</td>
<td>COAST Workshop and seminars will be organized periodically for external experts as well as stakeholders. Workshops will be targeted towards maritime education with a strong focus on simulator training and assessment for both academia and industry. Alumni and student meetings, student conferences will be held.</td>
<td>The workshop titles and themes will be decided with joint meetings with the student advisory board and executive board.</td>
</tr>
<tr>
<td>Conference Presentations</td>
<td>Delegates and students from partner universities will attend scientific conferences concerned with the objectives and mission of the COAST project. Moreover, the COAST project and its results will be presented in conferences organized by other simultaneous projects.</td>
<td>COAST will arrange national conferences for practice oriented educational programs where findings and developed solutions will be communicated within and across domains.</td>
</tr>
<tr>
<td>Publications</td>
<td>COAST intends to share the findings to the wider scientific community through academic papers published in leading international and peer-reviewed journals. A precise protocol for the generation of high-quality academic publications will be established which includes review and authorship policies.</td>
<td>The research originating from joint workshops will be submitted to high impact journals. A dedicated book volume on “Maritime Simulation and Training” will be published in collaboration with partners.</td>
</tr>
<tr>
<td>Engagement with other similar projects</td>
<td>Active contact will be pursued with other projects in similar domains. COAST will invite experts from healthcare and other domains that also use simulators and practical work experience in the field of education. This would both open for national and international dissemination and enable cross-domain interaction to learn from other domains facing similar problems</td>
<td>Mobility and synergy with other ongoing projects at USN will ensure that the students and staff at COAST engage in research exchanges which can lead to the cross-fertilization of ideas and practices.</td>
</tr>
</tbody>
</table>
Evaluation and impact framework

The steering committee (including student representatives) will evaluate COAST progress annually. In addition, periodical “Progress update” meeting will take place in the organization, deliverables and outcomes such as publications, faculty reports, student satisfaction surveys, retention rates and student grades will provide feedback to the work packages. Key milestones of COAST are formulated in Table 3 below to provide a measure of progress:

Table 3: Key milestones for COAST

<table>
<thead>
<tr>
<th>Key Milestones</th>
<th>Title</th>
<th>Relevant Work package</th>
<th>Qtr</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>Kick-off meeting</td>
<td>Project mgmt</td>
<td>1</td>
<td>2020</td>
</tr>
<tr>
<td>M2</td>
<td>COAST partner web-portal established</td>
<td>Project mgmt</td>
<td>1</td>
<td>2020</td>
</tr>
<tr>
<td>M3</td>
<td>COAST website established</td>
<td>Project mgmt</td>
<td>2</td>
<td>2020</td>
</tr>
<tr>
<td>M4</td>
<td>Nomination of members of steering committee, reference groups</td>
<td>Project mgmt</td>
<td>2</td>
<td>2020</td>
</tr>
<tr>
<td>M5</td>
<td>Student outreach events/activities to promote COAST</td>
<td>WP3</td>
<td>3</td>
<td>2020</td>
</tr>
<tr>
<td>M6</td>
<td>PhD student(s) hired and/or assigned to task/WP</td>
<td>WP2</td>
<td>4</td>
<td>2020</td>
</tr>
<tr>
<td>M7</td>
<td>Student advisory board established</td>
<td>WP3</td>
<td>1</td>
<td>2021</td>
</tr>
<tr>
<td>M8</td>
<td>Workshop(s) with student, advisory and reference group - I</td>
<td>WP4</td>
<td>2</td>
<td>2021</td>
</tr>
<tr>
<td>M9</td>
<td>Report detailing findings of workshops and literature reviews</td>
<td>WP1</td>
<td>3</td>
<td>2021</td>
</tr>
<tr>
<td>M10</td>
<td>Student Alumni network established</td>
<td>WP3</td>
<td>4</td>
<td>2021</td>
</tr>
<tr>
<td>M11</td>
<td>First employee exchange(s) across institutions</td>
<td>WP4</td>
<td>1</td>
<td>2022</td>
</tr>
<tr>
<td>M12</td>
<td>Workshop(s) with student, advisory and reference group - II</td>
<td>WP4</td>
<td>2</td>
<td>2022</td>
</tr>
<tr>
<td>M13</td>
<td>Instructor professional development course(s) - I</td>
<td>WP4</td>
<td>3</td>
<td>2022</td>
</tr>
<tr>
<td>M14</td>
<td>Integration of COAST into formal quality systems</td>
<td>WP4</td>
<td>4</td>
<td>2022</td>
</tr>
<tr>
<td>M15</td>
<td>Second employee exchange(s) across institutions</td>
<td>WP4</td>
<td>1</td>
<td>2023</td>
</tr>
<tr>
<td>M16</td>
<td>Workshop(s) with student, advisory and reference group - III</td>
<td>WP4</td>
<td>2</td>
<td>2023</td>
</tr>
<tr>
<td>M17</td>
<td>Completion of simulator experiments</td>
<td>WP2</td>
<td>3</td>
<td>2023</td>
</tr>
<tr>
<td>M18</td>
<td>Instructor professional development course(s) - II</td>
<td>WP4</td>
<td>4</td>
<td>2023</td>
</tr>
<tr>
<td>M19</td>
<td>International COAST Conference</td>
<td>WP4</td>
<td>1</td>
<td>2024</td>
</tr>
<tr>
<td>M20</td>
<td>Curriculum development report</td>
<td>Project mgmt</td>
<td>2</td>
<td>2024</td>
</tr>
<tr>
<td>M21</td>
<td>Exit strategy implementation report</td>
<td>Project mgmt</td>
<td>3</td>
<td>2024</td>
</tr>
</tbody>
</table>

Exit strategy

The successful completion of the project will lead to certain deliverables in the form of curriculum development, institutional development and knowledge creation that will continue to yield dividends even after the completion of the funding period. The common curriculum developed will lead to the standardization of education and practices across the consortium partners and in the wider maritime education community globally. The instructors/researchers will upgrade and develop their formal competence through dedicated Masters/PhD projects that will lead to the development of human capital at the institutions. The formal establishment of student bodies will be continued with funding from the department’s budget. These changes will lead to the development of new organizational culture and standardization at COAST that will enable to continue the associated research in the area of maritime simulator education at a global level post funding.
Synergies with on-going projects

In recent years, USN has been received several grants for improving maritime simulator-based training. In 2016, a sum of **1.3M EUR** was awarded by the Research Council of Norway (RCN) for project titled – *Innovating maritime simulators through the use of Virtual and Augmented Reality (Innotraining)* in partnership with Kongsberg Digital. The project is aimed at developing futuristic wearable VR/AR simulators for maritime training and led to an allocation of 1 PhD position. In 2018, a **1M EUR** grant was awarded by EU under Horizon2020 scheme for the project titled – *Enhancing human performance in complex sociotechnical systems (ENHANCE)*. The project is the first EU Horizon2020 project awarded to USN and will enable the exchange of staff and researchers across academic and industrial partners of USN, to identify commonalities between maritime and process industry and apply the findings for enabling safer maritime operations. UiT are currently working on a project “Wearable Experience for Knowledge Intensive Training (WEKIT)” which was elected and financed by Horizon 2020, European Commission. The main objectives of the project are first, to provide framework for capturing experience of an expert. Second, to provide this experience to a trainee in a virtual or augmented reality setting. The consortium consists of thirteen members belonging to different universities and industries from Germany, Italy, United Kingdom, Netherland, Finland, and Norway. Some examples of projects the university HVL are working on is “a study of maritime competencies now and for the future” and “ARCEVAC – Evacuation of passenger vessels in arctic conditions”. Further, they are leading the large project Human maritime autonomy enable (HUMANE) where one of the focus areas of the project is the competence of seafarers. It is funded by **1.5M EUR** from the research council of Norway. All the consortium partners are part of this project. NTNU, in collaboration with NASA-AMES and SRI is developing objective tools using simulators to create complete risk image involving human factors and their assessment in demanding maritime operations, a Research Council of Norway funded project. Other NTNU projects include mapping international maritime studies to understand the standing of maritime education in Norway with reference to the national curriculum. The COAST consortium – through their complementary experience in maritime education, simulator training and performance assessment - will ensure the leadership position of Norway in the maritime sector and will immensely benefit the global maritime community.

**Budget** (See appendix)
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## Budget Overview

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#### Maintenance

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#### Course development

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#### PhD candidates

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#### Direct staff (merit syst. incl)

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#### Administration, ind cost

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#### PhD candidates

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#### Infrastructure, ind cost

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#### Administration, ind cost

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<td>1.19 %</td>
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#### Guest lectures

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<td>0.48 %</td>
<td>1.43 %</td>
<td>1.91 %</td>
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**Budget explanation for SFU**

The COAST budget consists of all the costs associated with the center including **direct** and **indirect** center expenditures. The budget is divided into two main categories.

- **DIKU budget**, fund required to establish the center and will be distributed among partners and
- **In-kind**, provided by each institution dedicated to the center.

**Project management** costs are distributed between the consortium partners with about 27% allotment for USN (Inger Johanne Lurås as Project Manager and Salman Nazir as Scientific Project Leader) and about 11% for each partner from the DIKU budget. Moreover, USN will dedicate 38% of the total project management costs of the center from In-Kind.

As for the COAST **direct costs**, the center will capitalize on the existing simulators with annual maintenance costs and an investment on the fourth year to modernize and improve the performance of the simulators. The simulators budget will be allocated from In-kind. In addition to simulators costs, a fraction of the budget will be allotted to Equipment and teaching materials required to support the learning outcomes.

Course development cost for planning and execution of new training methods will include necessary internal and external consulting services.

The costs associated with workforce will comprise teachers and direct staff where performance management process (merit system) will be applied. Furthermore, PhD candidates’ budget will be spread out for four years with 75% research and 25% teaching and training activities, equally budgeted from DIKU and In-Kind for 10 positions.

Over 9% of the total budget will be assigned directly to student’s active involvement (e.g., meetings, workshops, activities, collaborative exercises, industrial visits, etc.). This budget will also support student activities through student union programs such as workshops, seminars etc. Moreover, students will be employed for research activities as student assistants within WP2 & WP3.

Several other overheads connected to the center will include yearly indirect infrastructure cost, travelling expenses (to be used for continuous interaction among consortium partners) and purchase of services from external sources. Additional external expenses for dissemination and invitation of guest lecturers from international partners and industry are also considered in the budget.
Centre of Excellence in Maritime Simulator Training and Assessment – Institutional Statement

The four higher education institutions in Norway (USN, HVL, NTNU & UiT) offering maritime education established the MARKOM 2020 consortium in 2011. The maritime industrial clusters’ economic importance to national economy was the main governmental motivation to strengthen the higher maritime education in Norway. The government has supported the consortium with substantial resources since the establishment. The MARKOM 2020 efforts have results in significant quality development within maritime education, research and infrastructure. The four universities have supported the governmental in kind, which acknowledge the strategic importance of this field for the institutions.

The consortium partners offer study programs on bachelor and master level, and together they run a Ph.D. program within nautical operations.

Maritime industry being technologically complex and high value rely on simulators for training to a significant extent. Simulators enable the trainees to learn complex operations of the industry that enhance real world safety and reduce operational costs. The use of simulators therefore is integral in maritime education. The four partners in the consortium have large and modern simulators for use in education and in several important fields in the maritime study programs. The use of simulators has a long tradition within maritime education and constitute high-quality knowledge base for education is established by them. The practices and technologies of maritime simulators have benefits beyond maritime education and allow exploring the commonalities and structure with other high-risk industries as well. In addition, the institutions have developed a close relation to simulator producers and the maritime industry. This relationship is a driving force for innovation in maritime education and value creation for industry. Therefore, the establishment of a center of excellence in maritime simulator training and assessment (COAST) is in line with the consortium institutes, industry and government efforts.

The Ministry of education has developed a strategy for digitalization 2017-2021 for the higher education institutions. This strategy, which the institutions are committed to follow up, emphasizes the use of personalized, digital tools for the student, teacher and university management. The Ministry’s strategy is mirrored in the consortium partners own strategies. For example, in USN strategy for quality of studies, one of five main aims is to offer student centered, varied and relevant delivery methods using digital technology. Further innovation in student centered, simulator aided teaching will thus be important for the maritime education. In addition, the COAST center will be a part of an institutional ecology system for student centered, digital teaching innovation initiatives in other fields of study such as for example health-, teacher, and management educations.

The four consortium partners of COAST are committed to provide in kind resources in the SFU lifespan from 2020 to 2024 as follows: USN: 30,4 mill NOK HVL, NTNU, and UiT with 11,575 mill NOK each.
Sincerely,

**Petter Aasen**  
Rector  
University of South-Eastern Norway

**Gunnar Bovim**  
Rector  
NTNU

**Anne Husebekk**  
Rector  
UiT The Arctic University of Norway

**Berit Rokne**  
Rector  
Western Norway University of Applied Science

*Dette brevet er elektronisk godkjent, og har derfor ikke fysiske signaturer.*
Salman Nazir  
(Scientific leader - COAST)  
Associate Professor  
Head of Training and Assessment Research Group (TARG)  
Department of Maritime Operations  
University of South-Eastern Norway

CURRENT AND PREVIOUS POSITIONS

2015-Present  
**Associate Professor** - Faculty of Technology, Natural Sciences and Maritime Sciences, Department of Maritime Operations, University of South-Eastern Norway

2015-Present  
**Head of Training and Assessment Research Group (TARG)** - University of South-Eastern Norway

2015  
**Postdoc** - Department of Maritime Technology, Management and Innovation (Human Factors Research Group), University of South-Eastern Norway

2014  
**Researcher** - Department of Maritime Technology, Management and Innovation (Human Factors Research Group), University of South-Eastern Norway

2014  
**Postdoc** - PSE-Lab at Department of Industrial Chemistry and Chemical Engineering, Human Factors in Complex Operations, Politecnico di Milano, Italy

2011-2014  
**Research grant holder and lecturer** - Chemical Engineering Department, Politecnico di Milano, Italy

2009-2010  
**Lecturer** - Chemical Engineering Department, COMSATS Institute of Information Technology, Pakistan

2007-2009  
**Graduate researcher** - Process Systems Engineering laboratory Department of Materials Science and Chemical Engineering, Hanyang University, South Korea

FUNDINGS AND GRANTS AS PROJECT LEADER

2019  
Enhancing Human Performance in Complex Socio-technical Systems. Funding agency: **EU Horizon 2020**, budget 1,099,400 EUR.

2017  
Workshops on Improving Maritime Education, Training and Performance Assessment. Funding agency: **MARKOM2020**, budget 170,000 EUR.

2017  
Innovating Maritime Training Simulators Using Virtual and Augmented Reality (InnoTraining). Funding agency: **Research Council of Norway**, budget 1,460,000 EUR.

2017  
SFU pre-project – Simulator Based Education for Maritime Professions. Funding agency: **MARKOM2020**, budget 110,000 EUR

2016  
Writing EU application as coordinator. Funding agency: **Research Council of Norway**, budget 55,000 EUR.

2016  
Research Collaborations (IS-DAAD Program) with Ruhr University Bochum. Funding agency: **Research Council of Norway and German Academic Exchange Service (DAAD)**, budget 6,500 EUR

2015  
Workshops on training and performance assessments in Maritime Domain. Funding agency: **MARKOM2020**, budget 1,250,000 EUR.

2015  
PhD Position at Department of Marine Operations, University of South-Eastern Norway. Funding agency: **MARKOM2020**, budget 330,000 EUR

EDUCATION

2011-2014  
PhD: Industrial Chemistry and Chemical Engineering, Specialization: Human Factors for complex systems  
Title of thesis: **Improving Industrial Safety by Novel Training and Assessment Methods**  
Department of Chemical Engineering, Politecnico di Milano, Italy

2007-2009  
Master: Chemical Engineering, Specialization Process System Engineering Department of Materials Science and Chemical Engineering, Hanyang University, South Korea

2002-2006  
B.Sc. in Chemical Engineering, Bahuddin Zakariya University, Pakistan (2nd position among 106 students, 2nd annual)

ORCID:  
[http://orcid.org/0000-0002-2058-6147](http://orcid.org/0000-0002-2058-6147)

Research Gate:  

LinkedIn:  
[https://no.linkedin.com/in/salman.nazir](https://no.linkedin.com/in/salman.nazir)
FELLOWSHIPS AND AWARDS

2013-2014  Research grant holder (aimed for young researchers) Department of Chemical engineering, Politecnico di Milano, Italy

2014  Cum Laude for PhD title, Politecnico di Milano, Italy

2011 & 2013  Young researcher grant Politecnico di Milano, Amount 40,000 EUR, Grant holder

2010  Most productive researcher of the year, Institute of Information Technology CIIT, Lahore, Pakistan

2007-2009  Scholarship for Master in Chemical Engineering, Hanyang University, South Korea

SELECTED BOOK EDITED

4 books printed and 2 books in press in total


SELECTED PUBLICATION

H-index of 14, i10-index of 19 (ref: Google scholar): 47 articles in peer reviewed journals, 29 conference proceedings, 11 peer reviewed book chapters, 2019


TEACHING ACTIVITIES

2018-Present  Main Lecturer – Ph.D. course: Decision Making and Performance Assessment (PN-DM9000), University of South-Eastern Norway

2015-Present  Main Lecturer – Master course: Human Technology Organization (MM-HTOS080), University of South-Eastern Norway

2015-Present  Guest Lecturer – Bachelor course: Human Element in Shipping and Logistics (FE-HES3500), University of South-Eastern Norway

2015-Present  Guest Lecturer – Master course: Organization and leadership (MM-ORG4001), University of South-Eastern Norway

2012-2014  Guest Lecturer – Risk Based Decision Making in Complex Systems Politecnico di Milano, Italy

2011-2014  Laboratory exercises and co-teacher – Instrumentation and Process Control of Chemical Plants, Process Systems Engineering, Calculus for Chemical Engineering, Politecnico di Milano, Italy

2010-2011  Main Lecturer – Simultaneous Heat and Mass Transfer, Process Economics COMSATS Institute of Information Technology, Pakistan

ORGANISATION OF SCIENTIFIC MEETINGS INSTITUTIONAL RESPONSIBILITIES

2018-Present  Chair / co-chair on International Conference on Human Factors in Training, Education and Learning Sciences, Applied Human Factors and Ergonomics, AHFE

2018- Present  Book (co-)editor of Advances in Training, Education and Learning Sciences, CRC-press/Springer

2017-Present  Official member of leadership group at Department of Maritime Operations, University of South-Eastern Norway

2015-Present  Project leader/manager and host of Workshops on Training and Assessment, University of South-Eastern Norway

2017-2018  Leader of Centre of Excellence for Maritime Education (Pre-project at national level), under MARKOM2020.

2016  Postdoc selection committee member, University of South-Eastern Norway

SUPERVISION EXPERIENCE

2017-Present  Main supervisor of 1 Post-doc, University of South-Eastern Norway.

2015-Present  Main supervisor of 5 Ph.D. students, University of South-Eastern Norway

2015-Present  Main supervisor of 14 Master students, University of South-Eastern Norway

2007-2009  Scholarship for Master in Chemical Engineering, Hanyang University, South Korea

2010 Most productive researcher of the year, Institute of Information Technology CIIT, Lahore, Pakistan

2011 & 2013  Young researcher grant Politecnico di Milano, Amount 40,000 EUR, Grant holder

2014  Cum Laude for PhD title, Politecnico di Milano, Italy

2013-2014  Research grant holder (aimed for young researchers) Department of Chemical engineering, Politecnico di Milano, Italy
Curriculum vitae Astrid Camilla Wiig


EDUCATION

2019 PhD: Connecting everyday and academic learning practices. A teacher challenge? Disputation date: 29.05.2019. Faculty of Humanities, Sports and Educational Science/Department of Educational Science/University of South-Eastern Norway/Norway


1996 – 1997 Mentoring, Norwegian Didactics and Social Sciences. Oslo University College

1992 – 1996 Bachelor. Teacher Training Education. Oslo University College

1990 – 1991 Art History, Italian and English (non-Audit). The American University of Rome

CURRENT AND PREVIOUS POSITIONS

2013-2018 PhD. Candidate in KnowMo-project, financed by the Norwegian Research Council. Faculty of Humanities, Sports and Educational Science/Department of Educational Science/University of South-Eastern Norway/Norway

2010-current Assistant Professor. Faculty of Humanities, Sports and Educational Science/Department of Educational Science/University College of South-Eastern Norway/Norway

2013-current Assistant Professor in Pedagogy for Maritime Management. Faculty of Technology, Natural Sciences and Maritime Sciences, Department of Maritime operations/University of South-Eastern Norway/Norway

FELLOWSHIPS, AWARDS AND PRIZES

2015 – 2016 Scholarship from the Norwegian Research Council to University of California, Berkeley, Graduate School of Education as a Ph.D. candidate.

MOBILITY


1990 – 1991 Art History, Italian and English. The American University of Rome

TEACHING ACTIVITIES AT UNIVERSITY OF SOUTH-EASTERN NORWAY

2011–current Seminar teacher, Master level: Pedagogy in Maritime Management and Pedagogy in Master of Pedagogical Texts

2010-current Seminar teacher, Bachelor level: Pedagogy in Teacher Training Education, Primary (GLU 1-7) and Secondary school (GLU 5-10) Pedagogic Supervision, Module 1 and 2
INSTITUTIONAL RESPONSIBILITIES

2014 - 2016   Member of Board: Ph.D. candidate’s member of Research and Development-board/University of South-Eastern Norway

PROJECT MANAGEMENT EXPERIENCE


SELECTED PUBLICATIONS:


INVITED PRESENTATIONS:


Researcher aiming to develop pedagogical interventions for maritime trainees for enhancing non-technical skills. I have 6 years of operational experience as 2\textsuperscript{nd} Mate onboard product tankers before academic interest brought me back at University. Masters in maritime management with technical specialization. Research interests include – Computer supported collaborative learning, Situation Awareness, Distributed Situation Awareness.

**EXPERIENCE**

**OCT 2017 – CURRENT**

**PHD RESEARCH FELLOW, UNIVERSITY OF SOUTH-EASTERN NORWAY**

Literature review, Data collection and analysis, Research dissemination, Networking and presentations. Thesis title – *Computer supported collaborative learning as an intervention for maritime education and training.*

**JAN 2014 – MAY 2015**

**2\textsuperscript{ND} MATE, NORDIC TANKERS A/S**

Navigation and Watchkeeping, Cargo operations, Life saving and fire-fighting appliance maintenance, ISPS watchkeeping

**JAN 2013 – JULY 2013**

**2\textsuperscript{ND} MATE, TORM A/S**

Navigation and Watchkeeping, Cargo operations, Life saving and fire-fighting appliance maintenance, ISPS watchkeeping

**NOV 2009 – AUG 2012**

**TRAINEE NAVIGATION OFFICER, TORM A/S**

Bridge watchkeeping support, Ship maintenance, Tank cleaning operations, ISPS watchkeeping

**EDUCATION**

**JUN 2017**

**MASTERS IN MARITIME MANAGEMENT, UNIVERSITY OF SOUTH-EASTERN NORWAY**

GPA – 4.4/5.0. Grade A in Master thesis. I also worked part-time in a research group as a research assistant. Thesis title – *Situation awareness information requirements for pilotage: A Goal directed task analysis.*

**AUG 2012**

**BACHELOR IN NAUTICAL SCIENCE, INDIRA GANDHI NATIONAL OPEN UNIVERSITY**

Cleared with distinction.
SKILLS

- Statistical analysis – Regression, Factor analysis
- Machine Learning
- Proficient in software - IBM SPSS, R, MS Word, MS Excel, MS Powerpoint
- Kongsberg K-SIM simulator operator certificate
- Data Visualization
- Task analysis
- Bibliometrics

ACTIVITIES

- Currently enrolled in PhD nautical operations program
- Committee member of Nautical Institute, Norway branch (2018 – Present)
- Achieved GMAT score of 670/800 (2014)
- Member of volunteer group – ISU aimed at facilitating international student experience in Norway

LIST OF ACADEMIC PUBLICATIONS

1. Situation Awareness information requirement for maritime navigation: A goal directed task analysis
   A Sharma, S Nazir, J Ernstsen
   Safety Science (Manuscript accepted – In press)
2. Distributed Situation Awareness in a demanding operation: A case study from sub-sea segment
   E Norstein, A Sharma, S Jungefeldt, S Nazir
   International Journal for Safety of Sea Transportation - Transnav (Manuscript accepted – In press)
3. Impact of autonomy on Gender Parity in maritime industry
   TK Kim, A Sharma, J Chae
   WMU Journal of maritime affairs (Manuscript accepted – In press)
4. Computer Supported Collaborative Learning as an Intervention for Maritime Education and Training
   A Sharma, S Nazir, AC Wiig, C Sellberg, M Imset, S Mallam (2018)
   International Conference on Applied Human Factors and Ergonomics, 3-12
5. Perspectives on Autonomy–Exploring Future Applications and Implications for Safety Critical Domains
   SC Mallam, S Nazir, A Sharma, S Veie (2018)
   Congress of the International Ergonomics Association, 396-405
6. Maritime simulator training across Europe: a comparative study
   S Nazir, S Jungefeldt, A Sharma (2018)
   WMU Journal of Maritime Affairs, 1-28
7. Distributed Situation Awareness in pilotage operations - Implications and Challenges
   A Sharma, S Nazir (2017)
   International Journal for Safety of Sea Transportation - Transnav 11 (2), 289-293

Other

- Nationality – Indian
- Languages – English, Hindi, Norwegian (Elementary)
- Date of birth – 11.06.1990
CV Margareta Lutzhoft

Professor of Maritime Human Factors
Department of Maritime Studies, Haugesund
Western Norway University of Applied Science (HVL)
Bjørnsongs gate 45, 5528 Haugesund
+47 947 937 96 mhl@hvl.no

My background and education
I studied at Kalmar Maritime Academy 1986-1989, BSc Nautical Science. I received my Master
degree of Philosophy on the 14th of December 2004 at KMT (Quality and Human- systems Engineering) / IKP (The department of mechanical engineering), at Linköping

Publication list

ORCID ID orcid.org/0000-0002-3800-8126

Peer-reviewed publications, journals and book chapters
workload and communication dynamics in standard and emergency scenarios. Journal of Shipping
and Trade, 3(2).
co-author of 4 chapters)
Designers: A Usability Study About a Tablet-Based Application Used on Ship Bridges. In N. A.
Stanton (Ed.), Advances in Human Aspects of Transportation. Proceedings of the AHFE 2017
International Conference on Human Factors in Transportation. Los Angeles, California, USA: Springer.
Mark S. Young (Ed.), Simulators for Transportation Human Factors: Research and Practice. Boca
Raton, FL: CRC press.
Lutzhoft, M., Petersen, E.S., Abeysiriwardhane, A. (2017). The Psychology of Ship Architecture and
The Journal of Navigation. 70 (3), 547-560
Abeysiriwardhane, A., Lützhöft, M., Petersen, E. S., & Enshai, E. (2016). Human-centred design
knowledge into maritime engineering education; theoretical framework. Australasian Journal of
Engineering Education, 21(2), 49-60. doi: 10.1080/22054952.2017.1287038
Practical Aspects of Shallow Water and Bank Effects. The Transactions of The Royal Institution of
Andrews, D., Sherwood-Jones, B., Lutzhoft, M., von Ubisch, B., Ventikos, NP., Sotiralis, PI and Lloyd,
CR (2015). “What the ship designer needs from mariners and shipowners”, Improving ship
operational design, The Nautical Institute, M Freeth (ed), 202 Lambeth Road, London, SE1 7LQ, United Kingdom, pp. 17-28. ISBN 9781906915285


Up until and including 2013 – 20 additional journal papers. 50+ Conference papers, posters etc.

**Received grants and funding (in SEK)**

At Linköping University and VTI between 2001-2006 about 11 000 000 SEK

At Chalmers between 2006-2013 about 56 000 000 SEK

At AMC, main and co-applicant (in AUD)

- 2014, Human Performance and Limitations, AMSA, 50 000
- 2014, Maneuvering vessels in ports, Ports Australia, co-applicant, 360 000
- 2014, Antarctic Gateway, ARC, two scholarships, 120 000 (total 24 000 000)
- 2015, e-initiatives, UTAS, 8 000
- 2015, Mitigating fatigue through ship design, AMSA, 25 000
- 2015, Visiting fellowship for Prof M Grabowski, UTAS, 8000
- 2016, Maneuvering vessels in ports (cont), Ports Australia, co-applicant
- 2016, Upgrade training ship’s bridge, AMSA, 10 000

At HVL, main and co-applicant (in NOK)

- 2017, Maritim IT, MARKOM2020, 700 000
- 2017, SESAME2, MAROFF, 670 000 (total 25 420 000)
- 2017, HUMANE, NFR, 12 000 000

**PhD students**

Finished before 2014: 7 PhD students at Chalmers University of Technology (Sweden)


2015 – Gerd Berner. Cybersecurity in the maritime domain

2016 – Vu Viet Dung. Design for teamwork, S-mode

2016 – MPhil student Asanka Rajapakse. Procedures and errors onboard

2017 – Tore Relling. The role of VTS in autonomous shipping

2018 – Richard Wild. Communities of practice in maritime piloting

2019 – PhD student Agnieszka Pikor. Future skills and psychological resources for personnel in the maritime industry.

2019- MSc student Trude Jacobsen. Colregs and communication – rules vs. practice
Frøy Birte Bjørneseth  
Associate Professor Human Factors  
Principal Engineer - Human Factors and Control Centers  
Email: frøy.b.bjórmesth@ntnu.no  
Mobile: +47 99 53 53 33

Summary  
Associate Professor at NTNU in Ålesund with responsibility for Human Factors, Industrial Psychology and HRM subject in teaching and research. Has a role in Kongsberg Maritime CM as principal engineer within the field of human factors and control centers, mainly within bridge environment (Rolls-Royce Unified Bridge) and engine control rooms. Specialist within human machine interaction and human factors in the maritime domain.

Main tasks:  
To ensure and maintain good usability and human factors of current and future Rolls-Royce products.

PhD thesis:  
Assessing the Effectiveness of Using Direct Gesture Interaction in a Safety-Critical Maritime Application. The outcome gave interesting findings. The thesis defended successfully October 26, 2010. Title awarded: Dr. Phil.

Specialties:  
Human Machine Interaction, Human Factors, Usability Studies, Human Error, Cognitive load assessment, user centered design process, operator interviews and field studies.

Experience  
Principal Engineer Human Factors & Control Centres, Kongsberg Maritime CM  
April 2019 – Present

Associate Professor Human Factors at NTNU  
September 2018 – Present

Associate Professor II at NTNU  
August 2016 – July 2018

Principal Engineer Human Factors & Control Centres, Maritime HMI and HF Specialist at Rolls-Royce Marine  
June 2007 – April 2019

External Examiner at NTNU  
June 2015 - Present

External Examiner at NTNU  
May 2009 - Present

Industry Partner Maritime Human Factors Laboratories  
January 2011 - 2015

PhD student at University of Strathclyde  
2007 - 2010 (4 years)  
Software Developer
August 2006 - June 2007 (11 months)
Software Developer
January 2006 - August 2006 (8 months)
Shop Assistant at Cubus
October 2005 - December 2005 (3 months)
Substitute Teacher at Municipality of Aalesund
August 2003 - September 2004 (1 year 2 months)
Shop Assistant at KappAhl
August 1996 - September 2004 (8 years 2 months)

Education:


Fagerlia Videregående Skole: GCSE, 1996 - 1999

Languages
English, German, French

Publications

Dynamic Positioning Systems – Usability and Interaction Styles ACM, NordiCHI October 2008 Authors: Frøy Birte Bjørneseth, Mark Dunlop, Jann Peter Strand

Assessing the Effectiveness of Multi-Touch Interfaces for DP Operation Human Performance at Sea Conference (Honourable mention in best student paper awards) June 2010 Authors: Frøy Birte Bjørneseth, Mark Dunlop, Eva Hornecker

Eye-Tracking and Ship Simulator Movement EyeTrackBehavior 2012 - Tobii Eye Tracking Conference on Behavioral Research October 9, 2012 Authors: Sashidharan Komandur, Qi Xu, Frøy Birte Bjørneseth


Towards Tactile Alarms Systems for Increased Awareness in Smart Environments IARIA SMART 2014: The Third International Conference on Smart Systems, Devices and Technologies Authors: Girts Strazdins, Sashidharan Komandur, Frøy Birte Bjørneseth
RESEARCH INTERESTS
Arctic Aviation, Saami Reindeer husbandry, cultural psychology, Human Factors, psychology, pedagogy, learning, CRM,

EDUCATION
Ph.D., (2005) Educational and cultural psychology, Faculty of Educational Sciences, Department of Educational research, University of Oslo, Norway
4-year program, which included 25 percent teaching.

Master (1995) Faculty of Humanities, Social Sciences and Education, Department of Education, UIT The Arctic University of Norway

PERSONAL DETAILS
Date of Birth: 7 September 1971.
Gender: MALE
Citizenship: Norwegian

UIT The Arctic University of Norway, Teknologibygget, Institutt for Ingeniørvitenskap og Sikkerhet (IIS) Klokkegårdshakken 35, 9019 Tromsø, NORWAY.

EXPERIENCE
Current position(s)
2017 - Professor. Faculty of Science and Technology, Department of Engineering and Safety, UIT The Arctic University of Norway.

2013 – 2017 Associate Professor
Faculty of Science and Technology, Department of Engineering and Safety, UIT The Arctic University of Norway.

2007 – 2009 Associate Professor
Faculty of Health Sciences, Department of Psychology, UIT The Arctic University of Norway.

Industrial experience
1996 - 2017
CRM Chief Instructor and supervisor
Lufthavntransport A.S. http://www.lufthavntransport.no/

2002 – 2015
CRM Instructor
Norwegian Air Shuttle norwegian.no

2014
Instructor
Swedish Armed Forces, Air combat school

2005 – 2006
Norwegian Maritime Authority
Instructor
Developed and carried out all education in beginners program for the Norwegian Maritime Authority

2005
Color Line
Instructor in leadership program for the Color Line top Management

2005
Grieg Shipping
Instructor in leadership program for the Grieg Shipping top Management
Fellowships and Awards

2009 – 2013 Post doc Faculty of Science and Technology, Department of Engineering and Safety, UIT The Arctic University of Norway.

2000 – 2005. Research Fellow. Faculty of Educational Sciences, Department of Educational research, University of Oslo, Norway.

Supervisions of Graduate Students and postdoctoral fellows

2002 – 2015 Number of postdocs 0/ Phd 2/ Master students 20 Faculty of Science and Technology, Department of Engineering and Safety, UIT The Arctic University of Norway and Faculty of Educational Sciences, Department of Educational research, University of Oslo, Norway.

Teaching activities


2009 – 2017 Teaching position: Post doc/Associate Professor. Topic: Human Factors. Faculty of Science and Technology, Department of Engineering and Safety, UIT The Arctic University of Norway.

Institutional Responsibilities

2014 - 2017: Project leader. Leader of National committee responsible for developing a master program in Aviation science. Faculty of Science and Technology, Department of Engineering and Safety, UIT The Arctic University of Norway.

2013 - 2015: Research group leader: Human Factors. Faculty of Science and Technology, Department of Engineering and Safety, UIT The Arctic University of Norway.

Commissions of trust

2013 – 2017. Member of Department board. Department of Engineering and Safety. Faculty of Science and Technology, Department of Engineering and Safety, UIT The Arctic University of Norway.

2015 2017. Member of Program Board, Master program in Societal Safety. Faculty of Science and Technology, Department of Engineering and Safety, UIT The Arctic University of Norway.


2008: Scientific Evaluator. NOKUT, Norway

Memberships of scientific societies

2006 - 2008: Member of research network “Flerkultrell barnevern”. Barnevernets utvikligssenter i Nord Norge.

2013 – 2015: Funding member. Research group «Human factors in the Arctic»

PROJECTS

In June 2015, a research proposal titled ‘Wearable Experience for Knowledge Intensive Training (WEKIT)’ was elected and financed by ICT H2020 (Horizon 2020, European Commission). The main objectives of the project are first, to provide a framework for capturing experience of an expert. Second, to provide this experience to a trainee in a virtual or augmented reality setting. The consortium consists of thirteen members belonging to different universities and industries from Germany, Italy, United Kingdom, Netherland, Finland, and Norway.

SELECTED PUBLICATIONS


