ECOWindS
Training and Simulation Platform

Recommendations for Cross Regional Dissemination

Document Title: Recommendations for cross regional exploitation of the ECOWindS Training and Simulation Platform.
Deliverables: D5.3
Due date: 31.10.15
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Date: 29.10.15
Version: 1.0
Status: Final
Work package: WP5
Work package leader: Hans Petter Hildre

Project title: ECOWindS
Project No.: 320042
Project start: 01.11.2012
Project end: 31.10.2015
Partners: Offshoreenergy.dk (OEDK)  
Technical University of Denmark (DTU)  
Germanwind GmbH (GW)  
NWES Property Services Ltd (OE)  
Ålesund Kunnskapspark AS (AAKP)  
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Nautilus Associates Ltd (NA)
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Executive Summary

An Overall goal of the ECOWindS project is to increase competitiveness of the Offshore Wind Servicing (OWS) sector, by reducing the OWS contribution to the cost of offshore wind energy production. The project aim is also to encourage growth of the industry and job creation in the ECOWindS regions and within the industry overall.

One of the key project elements is ‘cross cluster workforce competences and capacities’, where the aim is to define a common training and learning platform for realistic real-time simulation of OWS operations.

The first stage of developing the training platform was the mapping the OWS competences across the ECOWindS regions as well as defining the key operations that the training simulator would need to cover. Full details of this can be found in ECOWindS Report 5.1 “Cross Cluster Workforce Competences and Capacities” which is available for download on the ECOWindS website (www.ecowinds.eu).

The second stage then developed the training platform itself both by mapping potential training scenarios and describing core characteristics. This included developing the simulation tools and scenarios for certain lifting and placing operations. Full details of which can be found in ECOWindS Report 5.2: “Core Characteristics of the ECOWindS Training and Simulation Platform”, which can be downloaded from the ECOWindS web site.

Reprised below are the key benefits of using training by simulation in a virtual environment from ECOWindS Report 5.2:

- Simulator training is flexible and safe
- Simulator training is better structured and more efficient as opposed to learning on the job
- Simulator can be used to try out and study difficult or extraordinary operations, in single mode (single person training on skills) or in team mode.
- Simulation of operations under different weather conditions
- Emergency training, due to malfunction of accidents.
- Try things you never would do in reality
- Preplanning of operation, briefing and debriefing.
- Secure contracts due to customer confidence, risk level and time of operation.
- Well trained crews work more efficient and have fewer accidents.

Now that the ECOWindS training platform has been developed the focus is the recommendations for implementation of the simulation tool in the offshore wind industry. To achieve this, a joint cooperative and competitive approach is suggested. A Cooperative approach in the sense of sharing results in the innovation process, and a competitive approach in the training of individuals and teams.

As part of the wider dissemination the training tool was showcased as part of the ECOWindS Final Conference in Lowestoft, UK. The purpose of the presentation was to show the simulation tool to a wide audience of interested parties, this was done as part of a specifically focused training and skills event hosted by the Lowestoft College on 30th September 2015.
Contents

Executive Summary ........................................................................................................................................... 3

1. ECOWindS Project and the Promotion of an Improved European Offshore Wind Servicing Workforce ......................................................................................................................................... 5
   1.1. Definition of Offshore Wind Services ...................................................................................................... 6
   1.2. Overview of Cross Cluster Workforce Competences and Capacities ................................................. 9
   1.3. Purpose of this report ............................................................................................................................ 9

2. The Need for Real-Time Simulation Training Within Offshore Wind ................................................. 10
   2.1. Incorporating Findings from the ECOWindS Joint Action Plan .......................................................... 11
       2.1.1. Training and Standardisation .............................................................................................................. 11
       2.1.2. Training and Innovation ....................................................................................................................... 11
       2.1.3. Training and Communication ............................................................................................................. 12

3. Recommendations and Guidelines for Implementation ............................................................................. 13
   3.2. Competitive Implementation of Real-Time Simulator in OWS .............................................................. 14
   3.3. Scenario Development for Real-Time Simulator in OWS ..................................................................... 15
   3.4. Virtual Prototyping to Speed up Innovation in OWS ............................................................................ 15

4. Presentation of Real-Time Simulation in OWS ....................................................................................... 17

5. List of Abbreviations .................................................................................................................................. 19

References .......................................................................................................................................................... 20

Appendix 1 – Simulation of an OWS Operation ........................................................................................... 21
Appendix 2 – Training Event Delegate List .................................................................................................. 22
Appendix 3 – Skills Event Agenda .................................................................................................................. 24
Appendix 4 – ECOWindS Supporting Presentation ....................................................................................... 25
Appendix 5 – OSC Presentation on Simulation Tool ...................................................................................... 31
1. ECOWindS Project and the Promotion of an Improved European Offshore Wind Servicing Workforce

The overall goal of the ECOWindS project is to support development of the OWS industry through stimulating research, development and innovation (RDI) in four Research Driven Clusters (RDCs) within key regions around the North Sea.

The vision of the ECOWindS Project is:

“To pave the way for new research and understanding of how the costs of offshore wind servicing can be driven down through research, innovation and cross regional cooperation.”

The project will seek to achieve this vision through the following objectives:

- Increase capacity for innovation amongst and within ECOWindS Research Driven Cluster
- Develop regional smart specialisation strategies for OWS, which are integrated in an inter-regional Joint Action Plan
- Develop an international cooperation strategy for innovative OWS clusters to internationalise and exploit new business opportunities
- Increase innovation driven cooperation of stakeholders (authorities, research entities and local business communities) within and amongst the participating clusters by means of regional research agendas and a JAP
- Improve qualification capacities within and amongst the RDCs to secure a capable workforce and intelligent researchers that respond to the needs of the OWS sector across Europe and internationally.

The partner regions or Research Driven Clusters of ECOWindS are:

- South Denmark (Region Syddanmark Southern Jutland),
- East of England (Counties of Cambridge, Suffolk, Norfolk, Hertfordshire, Essex, and Bedfordshire),
- North West of Germany (Federal states of Bremen, Hamburg, and Niedersachsen),
- Region of Møre, in Norway

These regions are well suited to collaborate on measures to improve the development of OWS through targeted innovation. They are home to leading RDCs within offshore energy and maritime operations with existing expertise in offshore engineering and are, in three of the four cases, located in countries with substantial offshore wind markets that serve as drivers for national and regional technology development.

They have national and/or regional business development strategies and plans focused on offshore wind energy. They have a strong research and science base to support the endeavour of ECOWindS.
In addition to the expertise of project partners, to ensure ECOWindS results remain in line with industry demands feedback from a triple helix of offshore wind servicing stakeholders was necessary.

The triple helix consists of industry (both companies and trade bodies), science (education and research) and administration (local, regional and national government). Potentially a cluster entails flowing types of organisations:

- Enterprises or “Industry”: private (or publicly owned) enterprises who engage in value creation through offering Offshore Wind Services
- Knowledge institutions or “Science”: universities, polytechnics, vocational training, research institutes
- Government and other administration or “Authorities”: Policy makers, national, regional and local government, policy agencies/implementers
- Additionally there are support organisations/institutions: Industry associations, technology centres, technology transfer offices, business incubators

Involving this triple helix of stakeholders in the research throughout the project has not only ensured the results and recommendations effectively represent their experiences and address their challenges, but it also helps secure their buy-in to delivering the recommendations in a consistent and collaborative way.

1.1. Definition of Offshore Wind Services

For the purposes of the ECOWindS Project, OWS is defined as the assembly and installation through to Operation and Maintenance stages of wind farm activity. This is summarised in figures 3 to 5 on the following pages.

The project focused on the services related to assembly, installation operation and maintenance of an offshore windfarm, and will not cover other areas of the value chain such as manufacturing components. However, it is recognised the outcomes of the project may
have a future implications for these other elements of the full offshore wind value chain.

Figure 3: OWS within Offshore Wind value chain

Figure 4: Detailed breakdown of Assembly and Installation
Figure 5: Detailed breakdown of Operations and Maintenance
1.2. Overview of Cross Cluster Workforce Competences and Capacities

Offshore wind is still a relatively new technology when compared to more traditional sources of energy generations. Offshore wind was originally based on the same technologies that was used for onshore wind farms but due to the challenges and complexities associated with working offshore the two industries are now substantially different.

Offshore wind has been through and is still undergoing a period of innovation and learning to achieve greater overall effectiveness and allow it to be more cost comparable with other forms of energy generation. It is during this process that offshore wind is looking for innovative solutions from other sectors (i.e. aerospace, maritime, Oil & Gas, etc.) to allow it to meet the challenges it faces.

As already mentioned, a key aim of the ECOWindS project is to contribute to improved qualification capacities in the RDCs to secure a capable workforce that meets and responds to the needs of the OWS sector. Achieving this will improve the efficiency and reliability of offshore wind servicing operations, reduce costs, and contribute to increased competitiveness of the industry. In addition there will be an increase in the provision of high quality training schemes and facilities to support the development of the growing workforce that is required by the industry as it develops.

As part of the ECOWindS project the competences of each of the participating clusters has been mapped along with the training infrastructure and experience that each cluster has. By undertaking this mapping it is possible to see what areas need to be addressed in each RDC as well as cross cluster. Training across RDCs needs to be standardised, so that personnel can reuse certificates and diplomas when crossing national borders. Strengthening of the training will secure access of skilled personnel and will be an arena for innovation initiatives in the industry.

In its work on cross cluster workforce competencies and capacities, the ECOWindS project sets out to create a training and learning platform that is based on creating a virtual simulation based training tool. This has been achieved by firstly researching the requirement for such a training simulator, and then creating the outline for the simulator for further development and use beyond the end of the ECOWindS project.

1.3. Purpose of this report

The purpose of this report is to provide recommendations and guidelines for the implementation of the ECOWindS simulation and training platform. In addition the report will provide an overview of the demonstration event held as part of the ECOWindS Final Conference.
2. The Need for Real-Time Simulation Training Within Offshore Wind

OWS involves several costly and challenging marine operations such as heavy lifting, diving, ROV-operation, underwater deployment and maintenance as well as welding under the assistance of competent manoeuvring and dynamic positioning of vessel. In addition such operations regularly may need coordinated effort of highly skilled professionals using specialised equipment operating from several vessels simultaneously. The full potential of OWS can only be realised if it ensures that the work force across the regions has the right set-up of competences and is continuously adapted to implement new research-driven innovations at operational level.

In the Oil & Gas industry increasingly more of the training is moved into a virtual reality environment, especially safety and team related activities. This is for several reasons: Firstly, equipment is generally expensive and replicas of installations are too expensive to build. Secondly, critical situations are easily created in a virtual environment, without harming any of the involved personnel. Thirdly, operations are often irreversible, with one chance of success, thus training becomes paramount.

Industry, educators and training providers can harvest experience gained in the offshore Oil & Gas production in the North Sea and transfer elements to the Offshore Wind Industry.

Listed below are the core benefits of using training by simulation in a virtual environment:

- Simulator training is flexible and safe
- Simulator training is better structured and more efficient as opposed to learning on the job
- Simulator can be used to try out and study difficult or extraordinary operations, in single mode (single person training on skills) or in team mode.
- Simulation of operations under different weather conditions
- Emergency training, due to malfunction of accidents.
- Try things you never would do in reality
- Preplanning of operation, briefing and debriefing.
- Secure contracts due to customer confidence, risk level and time of operation.
- Well trained crews work more efficient and have fewer accidents.

Figure 5 shows the potential interfaces that virtual simulation can have with marine operations. It is important to see the virtual training as a supplement to the already ongoing training activity. In addition to an update of the technological profile of the training other issues will be addressed.
2.1. Incorporating Findings from the ECOWindS Joint Action Plan

In parallel to the work ECOWindS has been conducting on cross cluster workforce competencies and capacities the project has also been developing a Joint Action Plan. The Joint Action Plan (JAP) is a roadmap designed to support the development of the OWS sector and has been created with input from stakeholders to ensure that it meets the needs of the sector. The JAP has identified actions to meet the industries challenges which can be grouped in 4 categories: R&D, Standardisation, Skills & Training, and Communication. Results from JAP have been taken on board in the development of this work in order to be in line with the project priorities.

2.1.1. Training and Standardisation

Standardisation was the top priority from the JAP, and training and standardisation go hand in hand. When establishing an industry standard the need for training immediately arises, because work practices, technology and procedures must adapt to a new reality. Standardisation removes unnecessary complexity and results in reduced training needs on a basic level, when employees must handle fewer solutions. This opens up for a shift in training from a personal skills level over to an operational and team level. In this way standardisation will force change of behaviour from both individuals to entire organisations.

The effect of a modern training platform is that it will be an excellent venue for marketing the industry standard for all players in the value chain. On the other hand, it will also be a venue for improvement through feedback from participants. In this way, the training platform will be self-reinforcing and not fade over time. The experience from the oil industry shows that the virtual training by simulators play an increasingly important part of the dynamics in the industry in terms of validating best practice standards.

If the industry is succeeding in standardising, the training platform will be essential in the sense that companies and employees are forced to document training as a ticket to participate in the competition for service contracts. Here one can also imagine that the maritime classification societies may be challenged to take a more active role and help to define security parameters and levels of security for the industry.

2.1.2. Training and Innovation

The innovative element in a training platform mustn’t necessarily be the platform, it is now expected that training platforms have some sort of simulation environment and possibilities for different online services as well as working alongside existing traditional training.

The discussion will be on the level of a virtual training platform in relation to the content, complexity and scenarios included in the training. There are limits to how many times the employees can repeat the same standardised operation, before losing concentration and motivation. The need to deal with unexpected events, and the opportunity to experiment with alternative solutions set clear requirements for a future learning platform. The benefits from a virtual world computer set-up are unlimited. Disasters can be reviewed in a secure environment and with the obvious advantage of: at any time press the "stop" or "reset" button.

A second innovative element of having good functional description of parts and technology in a virtual environment is that new solutions can be introduced and tested in simulation trials at a low cost. This will benefit innovation initiatives at many levels and give researchers easy access to large scale experiments and support increased levels of innovation.
2.1.3. Training and Communication

When it comes to marketing of highly technical information to decision makers and stakeholders, as well as the public, modern simulation tools proves to be a good alternative.

A virtual world offers spectators a swift way out where the action happens and “live” images is a powerful tool when it comes to marketing. If proper training programs are attached as real-time simulations spectators can step into the critical situations and experience for themself challenges and industrial possibilities, especially when the environment is safe and the time and cost of demonstration is relatively low, compared to bringing people out to offshore environment.
3. Recommendations and Guidelines for Implementation

The number of jobs in the offshore wind sector is predicted to grow significantly as the operating capacity and build rate increases, increasing the demand for skilled professionals and trained individuals.

Feedback from industry is that lack of skills is a significant issue for the sector and reported to be most acute in engineering and technician roles, offshore specialisms and specific offshore wind roles. The industry also reports a high percentage of hard to fill vacancies in managerial and professional roles and must compete directly with other energy industries for the most skilled and experienced employees. Action now will ensure that companies have the skilled staff they need, and minimize the risk for suppliers cannot bid for new contracts because they are unable to recruit.

Among a number of Government and industry-led programs to develop and retain skills, the ECOWindS program has focused on training and skills as an important driver for improving the competitiveness on the OWS industry.

In order to maximize the effectiveness of the newly developed ECOWindS Training Platform the following areas should be pursued in its implementation:

- Cooperative and competitive implementation via neighbouring industries, specifically oil and gas.
- Scenarios development.
- Virtual prototyping tool for researchers to validate ideas.
- Adoption of the training platform by existing facilities.

3.1. Cooperative Implementation of Real-Time Simulator in OWS

Industry, educators and training providers can harvest experience gained over 4 decades of oil and gas production in the North-Sea. Technology and best practice work standards are easily adapted to the conditions in the offshore wind industry, where solid marine knowledge is very well welcomed. In a low price regime both for electricity and hydrocarbons, both industries faces similar challenges of reducing operating cost.

The oil and gas industry have adopted an open and cooperative approach to many of the problems while working in the North-Sea. This involves safety systems and technology associated with installation and maintenance of offshore facilities and infrastructure. The collective strategy has been to support collaborative research projects and resisting protected technology development. By teaming up with class and regulation companies, this has been an efficient strategy and lead to standards in every sector of the North-Sea. In the Norwegian sector the standard is called NORSOK. The strategy for the implementation of the virtual simulation tool as a learning and training platform should follow the same collaborative strategy.

The implementation of a simulation tool requires adaption to the problems and – scenarios that are of interest. The mathematical models have to be correctly implemented, in order to be useful in every aspect of its purpose. Graphical environment needs to be completed in line with the expectations of OWS infrastructure, both at sea and shore. Also the level of details must be set at a realistic level, especially when it comes to training.

An example here will naturally be the level of functionality and details in the nacelle of a turbine. A lot of these issues are not easily funded and a natural response is to team up with
innovation and research programs. The reason for this is that the virtual platform will serve as a perfect testbed for skilled researchers in vain of a costly test facility that represent an offshore environment. A perfect match so to say. This idea is also taken from the oil and gas industry where massive cost reduction in testing, both timewise and moneywise, is achieved.

As an implementation strategy, innovation projects must make use of a virtual simulation tool as a test facility for validation of ideas. Once this functionality is in place, a next step will be simulations, combined with rapid prototyping of innovation ideas, as a powerful tool for innovation programs. In return the training facilities will receive updated and increasingly advanced graphical environment for training purpose. A sharing strategy of tools is of essence in keeping cost at an acceptable level, and combined with mechanisms for protecting sensitive company information, this will benefit the whole offshore wind industry.

A part of the ECOWindS program has been to identify training facilities in each region that either has the capabilities for virtual training by use of simulators, or has the ambition to do so. Every region has that capability and during the project we have not meet any closed door. Most of these centres are doing training for marine navigation or oil and gas related training.

To adapt the training courses to the needs of the OWS, is of great interest for them and similarities in the training needs are easy to see, especially between OWS and Oil and Gas industries. However, training facilities cannot lift the investment needed to adapt to a new segment on its own. The call for cooperation is unanimously.

Standardisation was the top priority from the JAP, and training and standardisation go hand in hand. A cooperative strategy for establishing a simulation tool for training will be a giant step in the direction of standardisation in the OWS industry.

3.2. Competitive Implementation of Real-Time Simulator in OWS

The most effective method to reduce cost is by increasing competition in the market. OWS market is dominated by a relatively small number of industrial companies and often regulatory barriers play a significant role when crossing borders. A joint training platform will stimulate competition and make borders more invisible. One can also imagine that the maritime classification societies may be challenged to take a more active role to structure and regulate the OWS business.

Many of the simulator centres used in the oils and gas industry could be utilized by the offshore wind industry as well. The need of duplicating training facilities is not present. In a period with lower investments in the oil and gas industry in the North-Sea, and increase in offshore wind projects, one can argue that vacant resources can be directed from oil and gas towards offshore wind in relatively short period of time to fulfil training needs.

Competitive advantages to be achieved by use of simulators in training

- Scalability of the simulation tool
- Large number of people can be trained at a low cost on basic skills
- Same setup facilitates team training of complex operations
- Validation of procedures
- Responsiveness with respect to change in technology.
- Progress into future ultra - efficient solutions.
- Robotics.
3.3. Scenario Development for Real-Time Simulator in OWS

The widespread implementation of the training platform requires adaption to the problems and scenarios that are of interest to the industry. There are numerous activities associated with the assembly, installation, commissioning and ongoing operation and maintenance of a wind turbine.

The recommendation for the starting point for OWS is to look for challenges that are shared with the oil and gas industry, where the opportunity is that by making small changes to the scenario one can be in position to implement OWS training swiftly. Lifting and crane operation represents such a shared challenge between the two industries.

The challenges in cargo handling are many. Time issues play an important role in a port operation the high cost of the vessel puts pressure on all personnel involved to perform cost efficiently. At the same time regulations need to be followed. For the cargo transfer multinational crews are involved and the handling of heavy and oversized cargo is difficult even today. The consequence of failing or damaging equipment must also cause stress situations during the lifting operations and as a matter of keeping the insurance cost at an acceptable level it may be worth investing in training and validation of the process.

Documentation of the operation through a training situation may pay off in the long run. Simulators can also be used to study difficult or extraordinary cargo operations in single or tandem mode before starting the real lifting operation as a matter of securing a contract due to confidence of customer.

At an operator level, especially for crane operators, familiarisation with different types of cargo is important. As well as operation under different weather conditions and the ability to reproduce and repeat the very same conditions multiple times to get an optimal team performance. Emergency situations also need to be rehearsed and are well suited for a virtual environment.

An example training sequence would include representatives from the bridge level of the vessel, captain, loading officer, crane drivers, chief engineer and deck crew. On the land side representatives from the port will be: port crew, cargo owner, surveyor, logistics and planning personnel and crane operators if needed. The whole purpose of this exercise is to train the team properly.

3.4. Virtual Prototyping to Speed up Innovation in OWS

Virtual Prototyping, or rapid prototyping, shall support high-speed business change, innovation, product and production development processes, and value chain development. The processes are multi-disciplinary and interactive.

Customers and clients, operators, market and sales, design, engineering, production and supply chain will be brought to the arena during collaborative workshops. Industrial and academic as well as national and international partners will join together in cooperative programs.

The platform will hold several technologies:

- Virtual prototyping.
- Innovation labs.
- Big Data calculations.
- Demonstration in simulators.
- Training facilities.

The arena is connected together by a simulation engine and visualization theatres. The facility has to be built for commercial activity such that companies can be present for testing and verification of innovation ideas or verification of new products.

The advantage of virtual prototyping is believed to lead to a more rapid innovation process and simultaneously reduced risk and cost. This is a lesson learnt from international aerospace - and automotive industries. In this context the OWS industry will follow the mega trend in technology that we see today.
4. Presentation of Real-Time Simulation in OWS

As part of the ECOWindS Final Conference in Lowestoft, UK, a side event was held at the Lowestoft College on the topic of skills and training. The purpose of the side event was to showcase the work that had been carried out by ECOWindS in researching and developing a set of training scenarios to be used in virtual training for offshore wind servicing.

The detailed list and agenda for the event can be found in Appendix 2 and Appendix 3 of this report.

In addition to the overview and tour of the local facilities, which included a ship bridge simulator, two presentations on real-time simulation were given on the topic.

The first presentation was on the findings from work carried out by the ECOWindS consortium as part of the work package on Cross-cluster workforce competences and capacities, which focuses on skills and training.

The second presentation was from Joel Mills, CEO of OSC (Offshore Simulation Centre), on the commercial training activity in the oil & gas industry by use of real-time simulators and opportunities that OWS represent.

The presentation started with an introduction of the company and the history of offshore oil and gas industry training. This allowed the participants to gain experience of how virtual training works and the benefit it can have.

It focused on the values of a simulation as a training tool, technology and development in the training techniques.

One of the main issues of his talk was the essence of describing a “good” simulator.

His point was threefold:

1. The feeling of being engulfed by quality graphical images of the real world.
2. The need of having a correct mathematical behaviour of the operation. This is important in order to give true dynamical behaviour of the equipment in the operation, including ship motions and environmental conditions.
3. The focus on the human presence in the simulator. The need to be connected to other people or roles in the operation and to have live feedback as the operation enfolds.

The presentation also gave an overview of existing virtual training scenarios such as anchor handling, platform supply and crane simulation all of which has great relevance to cable laying and other scenarios.
The last part of the presentation was dedicated to an OWS example. The operation selected was the installation of a foundation by lifting it from a vessel in Jack Up position and lowering it to the sea bed, the process was also able to be done in reverse allowing the decommissioning of a foundation and placing it on the vessel deck. The presentation from Joel Mills is attached as Appendix 5 of this report.
5. List of Abbreviations

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<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>ÅUC</td>
<td>Ålesund University College</td>
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<tr>
<td>ECOWindS</td>
<td>European Clusters for Offshore Wind Servicing</td>
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<td>JAP</td>
<td>Joint Action Plan</td>
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<td>OEM</td>
<td>Original Equipment Manufacturer</td>
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<td>OWS</td>
<td>Offshore Wind Services</td>
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<td>RDC</td>
<td>Research Driven Cluster</td>
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<td>OSC</td>
<td>Offshore Simulator Centre</td>
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<td>EU</td>
<td>European Union</td>
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<tr>
<td>O&amp;M</td>
<td>Operations and Maintenance</td>
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<td>ROV</td>
<td>Remotely Operated Vehicle</td>
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<td>R&amp;D</td>
<td>Research and Development</td>
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<td>SCADA</td>
<td>Supervisory Control and Data Acquisition</td>
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References

[8] E.ON presentation to ECOWindS ‘Scroby Sands Offshore Wind Farm’
Appendix 1 – Simulation of an OWS Operation

The below images are a graphical representation of lifting a jacket foundation from a jack up vessel and installing them on the seabed.

Figure 8: A graphical sequence from the simulator of an OWS operation.
Appendix 2 – Training Event Delegate List

ECOWindS Final Conference:
Skills and Health & Safety Conference

30th September 2015
8:45 – 13:30, Lowestoft College, St Peters Street. NR32 2NB

Delegate List

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<th>First Name</th>
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<td>Ian</td>
<td>Pease</td>
<td>Lowestoft College</td>
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<tr>
<td>Hans A.</td>
<td>Pedersen</td>
<td>Offshoreenergy.dk</td>
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<td>Patrick</td>
<td>Phelan</td>
<td>Energy Business Catalyst</td>
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<tr>
<td>Kalle</td>
<td>Piirainen</td>
<td>Technical University of Denmark</td>
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<td>Judy</td>
<td>Preece</td>
<td>SSE</td>
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<td>Ferlin</td>
<td>Quantrill</td>
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<tr>
<td>Simon</td>
<td>Sanderson</td>
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<tr>
<td>Adam</td>
<td>Tucker</td>
<td>Seabed Scour Control Systems Ltd</td>
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<tr>
<td>Carl</td>
<td>Tunaley</td>
<td>Tyco Fire &amp; Integrated Solutions</td>
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<tr>
<td>Sophie</td>
<td>Wilson</td>
<td>EEEGR</td>
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# Appendix 3 – Skills Event Agenda

## Mini Skills and Health & Safety Conference

**Date:** Wednesday 30th September 2015  
**Venue:** Lowestoft College

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Presenter</th>
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<tbody>
<tr>
<td>08.45</td>
<td>Registration, Tea &amp; Coffee</td>
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| 09.15 | **Welcome & Introductions**  
Welcome & agenda for the morning given by a member of the ECOWindS consortium | Sarah Niddrie-Webb, Project Consultant, (Nautilus Associates Ltd./ECOWindS) |
| 09.20 | **Welcome to Lowestoft College**  
Lowestoft college will welcome delegates and give a short introduction to the academic and commercial courses they run. | Ian Pease, Commercial Director (Lowestoft College) |
|       | Delegates will then take a tour of the college, including their Sea survival training pool, offshore wind training tower, dynamic positioning equipment, offshore wind control room and their own ships bridge simulator. |                                                                           |
| 10.30 | Refreshment Break                                                    |                                                                           |
| 10.45 | **ECOWindS Findings on the requirements of Training**  
A presentation on the Importance of addressing the skills and training agenda, and the mapping work to define key skills sets and learning areas required for offshore wind servicing. | Gunnar Nyland, (Aalesund University College) |
| 11.00 | **An Introduction to the ECOWindS Training and Learning Simulation Tool**  
A presentation of the comprehensive training tools developed by the ECOWindS project, incorporating simulation models for training in key installation and servicing operations. | Joel Mills, CEO (Offshore Simulation Centre) |
| 11.30 | **The Importance of H&S in Offshore Wind Servicing**  
Presentation on the measures SSE takes to manage health and safety offshore. | Sid Anverali, General Manager for Greater Gabbard Offshore Wind (SSE) |
| 12.00 | **Innovative Cost Effective Approaches to Safety Offshore**  
Overview from Falck Safety on innovative ways to cost effectively manage H&S offshore | Hendrik Parmentier; (Falck Safety Services) |
| 12.10 | **Questions to the panel**  
The earlier speakers from Lowestoft College, the ECOWindS Consortium, Offshore Simulation Centre, SSE and Falck Safety will take part in a question and answer session. |                                                                           |
| 12.30 | Lunch Buffet                                                         |                                                                           |
Appendix 4 – ECOWindS Supporting Presentation

Gunnar Nyland
Associate Professor
Aalesund University College

Business areas

Most demanding: subsea, arctic, deep
Ocean wind: installation & service
Ocean Mining: innovation
Work Package 5 - Overview

WP5 Cross-cluster work-force competences and capacities

- The aim is to define a common training – and learning platform by use of realistic real-time simulation of Offshore Wind Operations.
  - Transfer experience gained in the Oil & Gas industry in the North Sea
  - Coordinate with Joint Action Plan

- Goal
  - Cost reduction
  - Competitiveness
  - Job creation and secure access of skilled personnel
  - Stimulate innovation and cross regional cooperation

Project Overview

Diagram showing the relationship between different work packages (WP2, WP3, WP4, WP5, WP6) and their roles in the project:

- STEPLED
- SWOT
- Internationalization strategies (WP3)
- Competence analysis
- R&D idea generation
- Management (WP1), Dissemination plan and activities (WP7)
WP 4 - Joint Action Plan

1. Establish a long lasting joint initiative for knowledge sharing and innovation between regions

2. Develop a value proposition for OWIS among industry stakeholders

3. Develop OWIS specific mission-oriented research, development and innovation program

4. Drive for international OWIS specific standards

5. Develop OWIS specific skills and training programs across regions

6. Develop an OWIS Industry Database

7. Establish OWIS Specific Test Sites and Research Infrastructure

8. Drive regulatory harmonisation on Occupational Health & Safety

Work Package 5 – Response to JAP

- **Training and Standardization**
  - Training is needed when introducing standards.
  - Validation of best practice standards
  - Simulation is cost effective on training large number of people

- **Real time Simulation and Innovation**
  - Detailed technical challenges can be tested at low cost in a simulator
  - Give researchers access to the whole picture
  - Disaster can happen in a safe environment.

- **Real time Simulation and Communication**
  - Simulators can demonstrate technology to decision makers
  - A virtual theater offers a swift way out where the action is
Work Package 5 – Learning Objectives

The learning objectives must be in-line with the overall project objective

- **Relevance for Cost Reduction and Competitiveness**
  - Well trained crews work more efficiently and have less accidents
  - Verification and optimization of work procedures
  - Preplanning of operation, briefing and debriefing.
  - Secure contracts due to customer confidence, risk level and time of operation.
  - High capacity training.
  - Simulator training is better structured and more efficient as opposed to learning on the job.
  - Train on operations that are expensive and/or difficult to reproduce:
    - Weather conditions,
    - Emergency,
    - Malfunction,
    - Try things you never would do in reality.

---

Work Package 5 – Learning Objectives

**Relevance for Innovation and Job Creation**

- Simulator training is flexible and safe.
- A simulation tool fits perfectly into a strategy for improving product quality by multidisciplinary innovation.
- Rapid prototyping needs a virtual reality as a test facility in a design phase.
- An efficient way of training a large number of workers in highly specialized work operations.
- Quick adaptation to changing technologies in a training environment.
Marine Operation simulation
From design → training → testing

- **Design & innovation** of marine operations, ships and equipment
- **Testing** and verification of unique operations, ships and equipment
- **Customized Training**

The Offshore Wind Industry – from land to ocean industry

- **OW is a land-based industry facing a marine innovation challenge.**

- The Offshore Wind Industry is a land-based industry that has gradually moved from land and then on to dipping its toes in the water close to shore. The industry is moving ever further offshore, while many of the solutions seem stuck in a land based frame of mind, such as use of jack-up barges etc. The industry needs to understand that it is becoming an ocean industry and make better use of solutions developed through maritime offshore in order to solve ever more complex and demanding operations.
Appendix 5 – OSC Presentation on Simulation Tool

Delivering the worlds most advanced offshore simulators

Joel Mills
The world's most advanced offshore simulators

In 2005 OSC started as an innovative university “spinoff company” and now has developed into a world-leading professional and mature company and today OSC is still breaking new limits.

Solution so real you forget you are in a simulator

It is easy to know what a good simulator is... You forget you are in one.
Rich environment (Real equipment/amazing visuals (depth of field)) & Real physics
OSC Offshore Simulator Evolution

2005

AHT/PSV

Deck Operations

Winch Operations

Crane Room

Engine Room

ROV

Seismic

2 x WROV Crane Vessel

2015

Virtual Prototyping

Critical Scenario Training

Team Performance Training

Operational Training

Anchor handling, complete training

AHT

Single or multi vessel training solutions:

Deck vessels, bridge, engine rooms, winch and crane.
Platform Supply vessel training

OSC Crane Simulators
Simulator Technology

Quality in training

However realistic a simulator, without the correct training courses you will not be able to have a realistic training environment.

Working together with the University college Ålesund allows:

- Simulation development to follow course needs
- Partnership leading to better results
Integrated operations - Subsea.

The subsea solution
Crane Simulator FATHOM

OSC Believe that our current Offshore Crane simulator is the best on the market today.

OSC are in a major development drive for its Crane product which will make it more versatile, flexible product allowing for a more realistic physics solution and the ability to add new functions and develop faster.

Meeting the needs of tomorrow

Working tightly with industry experts allows us to make the crane follow the new NORSOK and DNV Class A standards.

We are working to add real wind forces to the simulator to allow the next level of training. Affecting objects of different types in the correct way under the correct forces.

Subsea environments / wind

Our new crane system will allow very fast build times of new solutions
Wind

This Wind Demo shows how our new physics engine can be used to have real wind effects on objects.

With a wind of 14m/s on the blades surface you can see the colours showing the forces which in this case make the turbine turn.

Subsea cranes & environments

OSC new crane platform will allow us to add with ease subsea vessels which can connect together with WROVs or Obs ROVs

We know that Subsea will become a larger market in the offshore industry in the coming years.
Wind simulator substructure mounting

Floating wind turbine installation
The importance of the total..

Thank You