

GCE | NODE | GLOBAL CENTRE
OF EXPERTISE

A LEADING GLOBAL TECHNOLOGY CLUSTER

NorTex Seminar – Houston, OTC 2017

Anne-Grete Ellingsen, CEO GCE NODE

The Norwegian cluster program

Three levels:

- Arena
 - Norwegian Center of Expertise
 - Global Center of Expertise
-
- Co-funding (50 %)
 - Advisory
 - Knowledge and skills
 - Networking
 - Profiling



GCE NODE Strategic goals:



Maintain and increase global competitiveness in core markets



Expand competence and technology to new markets

Strategic focus - Increased competitiveness and new markets



Digitalization

- SFI Offshore Mechatronics
- Data Highway
- NorTex Offshore Data Analytics

Smart Production

- Future Robotics
- Digitalization network
- ICT Security
- 3D Printing
- Network for standardization

Blue Growth

- Offshore wind
- Deep sea mining
- Offshore Sea farming

Emerging Markets

- CCS / (U)
- Hydrogen
- Health
- Arctic & Cold climate
- New materials



Competence & New markets

- Sustainable value chain
- ISO certification



Sustainability and footprint

- Roadmap for the industry – 2030/2050 Ecotrack and documentation



Communications and Strategic Positioning

- OTC, ONS, Global Outlook, Energy Outlook, Sørlandets Oil& Gas Conference

From USD 80/90 → USD 27/35

A common industry effort - Digitalization – next step



Digitalization

- SFI Offshore Mechatronics
- Data Highway
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Smart Prod

- Future Robo
- Digitalization
- ICT Security
- 3D Printing
- Network for standardizatio



Modernize, simplify and harmonize standards and procedures

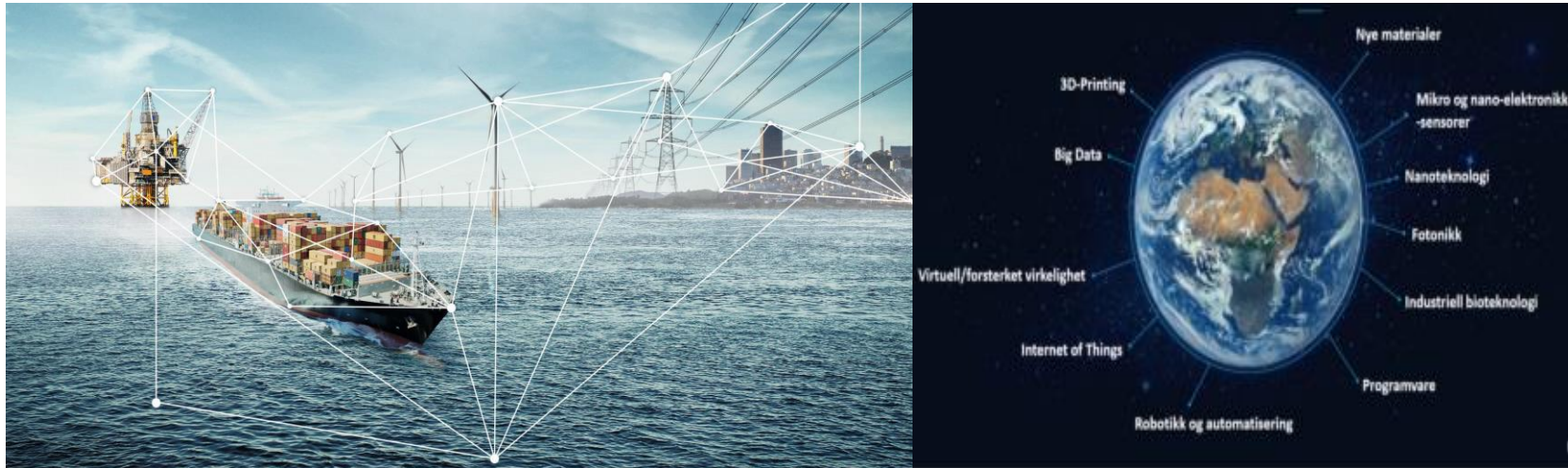
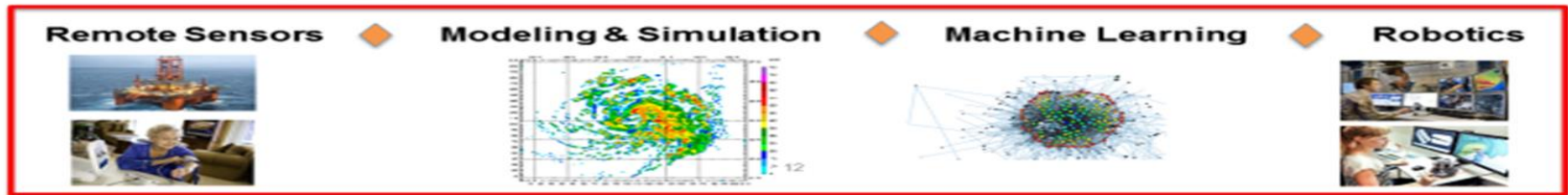


Sharing of information and standardization/reuse of concepts for design, contraction and operation.



Common strategy on digitalization, automatization and robotization.

A Connected World – From sensors to the IoT



Robotization and digitalization projects in the cluster:

- SFI Offshore Mechatronics
- Data Highway – Access to data in real time
- ICT data Security competence program
- 3D print / Additive Manufacturing (AM) technology projects
- Digital sustainable business models
- Cost reduction program by use of digital solutions
- Future Robotics network
- NODE Digitalization Network

Technology and competence to new markets

Blue Ocean Strategies



R&D and competence programs in the cluster:

- NODE R&D network
- Offshore sea farming network
- Marmine : Sub sea mining
- DeSMO : Sub sea mining
- Offshore wind – Market and Technology report
- PA&Decom - Market and Technology report
- Arctic market – Market and Technology reports
- Iran – Competence market work shops

Challenges facing the global energy and maritime industries

A business framework for sustainability and CO2 reductions



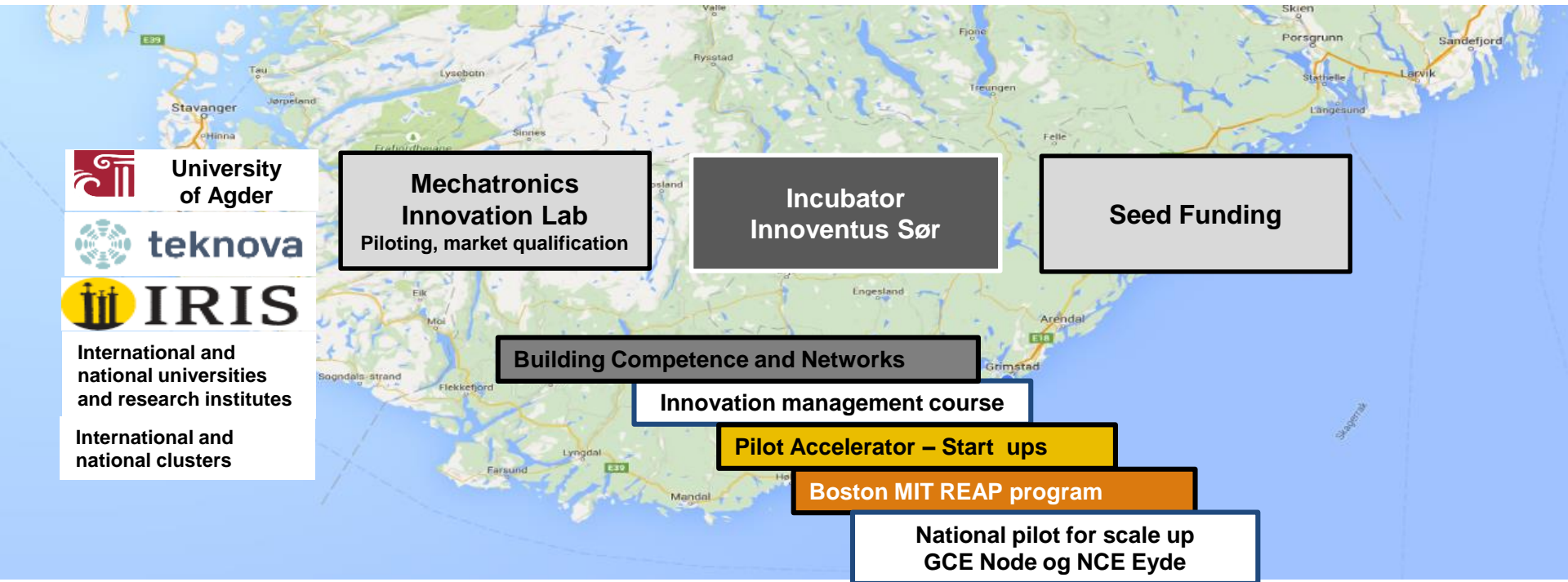
Strict environmental and safety regulations on NCS = Low average emissions compared to global average



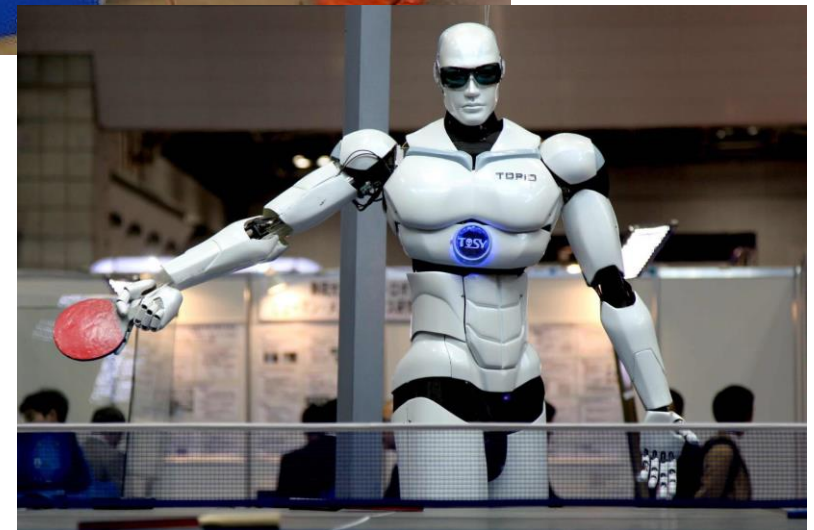
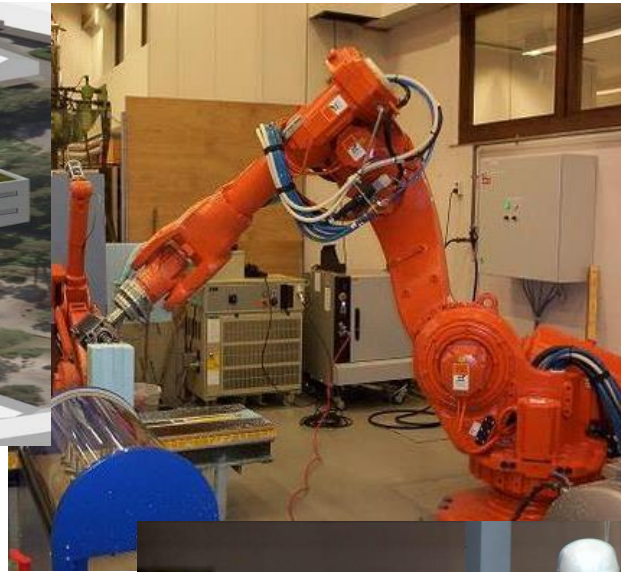
A roadmap for further CO2 reductions adopted for the industry in 2016.

A network and ecosystem for innovation

Agder - a competitive region for investments



Mechatronics Innovation Lab



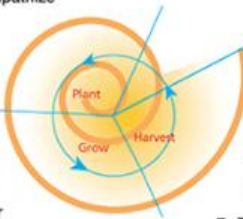
A Framework for Design Thinking

1. Discovery

Choose an affirmative, strategic topic. Gather data. Understand & empathize with unmet needs.

2. (Re)Frame opportunity

Look for patterns & insights. Question assumptions. Frame your POV. Define your scope.



3. Incubate

Switch gears. Feed your brain with diverse stimuli. Meditate. Sleep on it.

4. Ideate/illuminate

Experiment. Explore possibilities. Envision a desired future. Co-create in diverse team. Make your ideas visible.

8. Iterate & Scale

Evaluate. Learn. Create. Innovate.

7. Deliver

Final testing, approval and launch.

6. Rapid Prototype /test

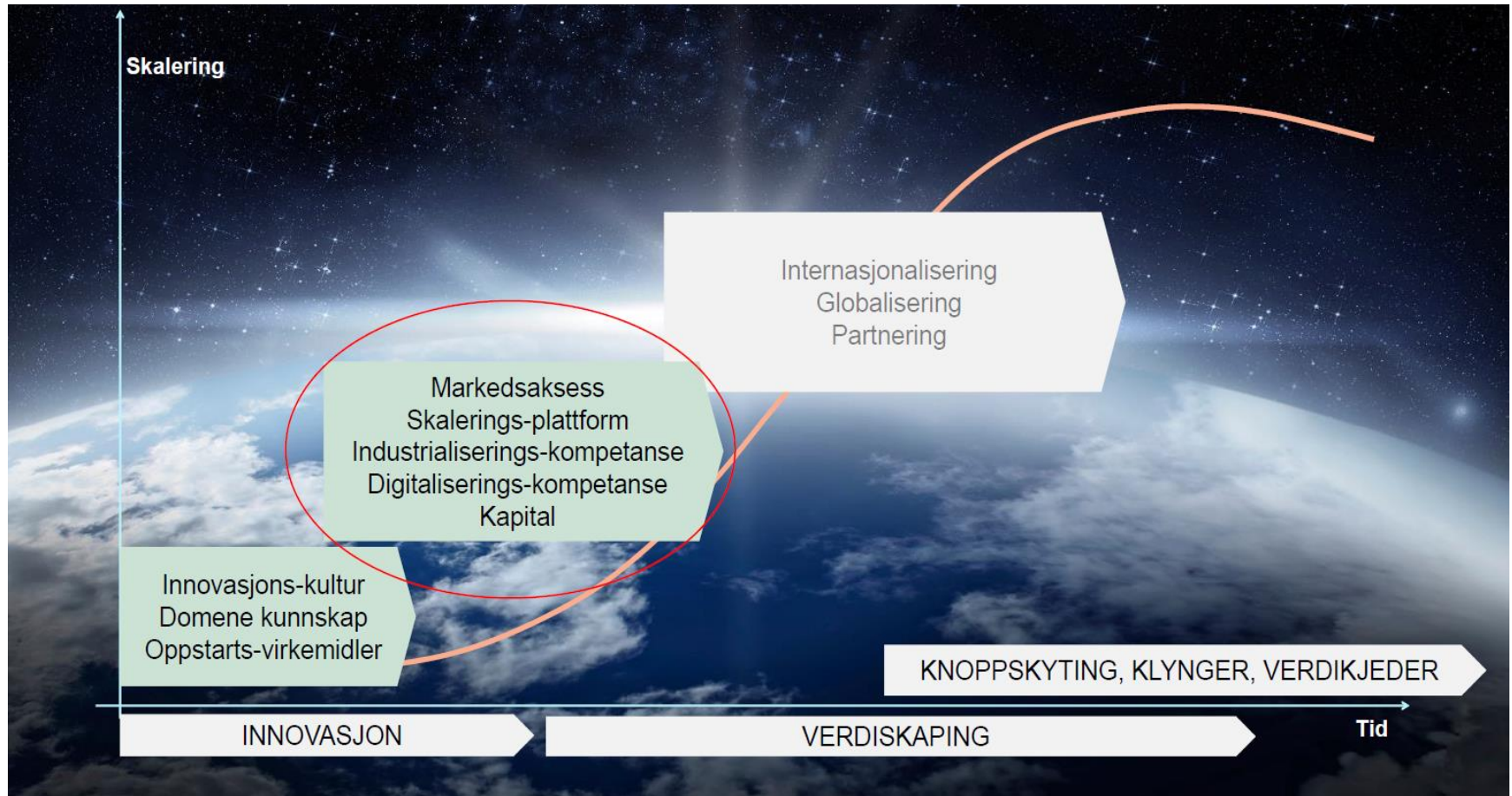
Think big, act small, fail fast; learn from end-users and refine.

5. Evaluate/Refine ideas

What is desirable, feasible, viable about your ideas? What are the constraints?

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Important to understand the digital shift



Robotization, digitalization and 3D printing – Solution for a sustainable industry

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Arnt Aske, Business Development Digitalization
GCE NODE

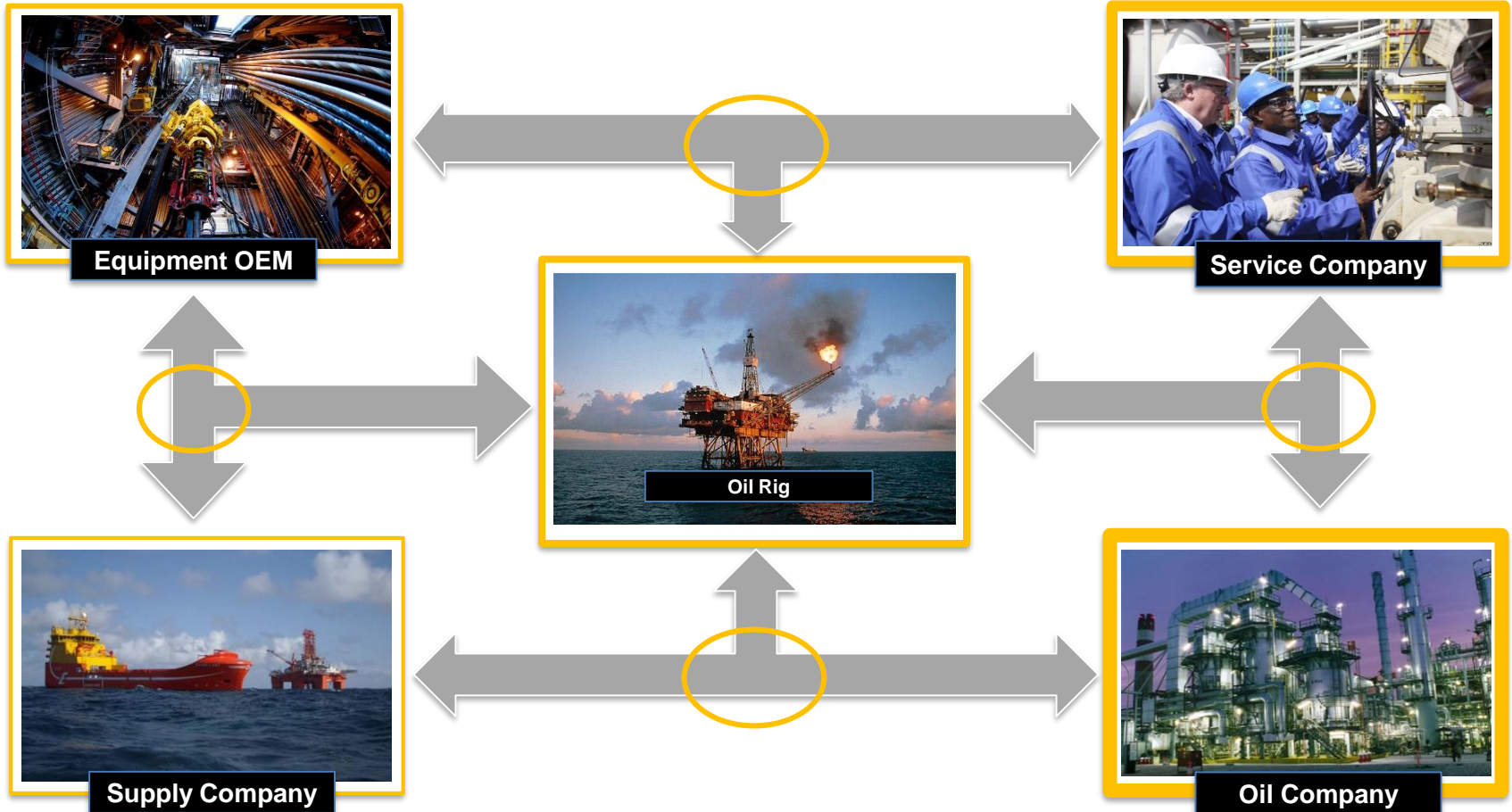
Background

- In 2015 Norwegian Oil & Gas was requested to carry out a “screening” survey based on communication and input from some of the major member companies being vendors and service providers within subject area.
- The objectives was to address and discuss:
 - Effectiveness and cost savings
 - Standardization
 - Expanded use of onshore operation centers
 - Increased integration of suppliers in the data stream from offshore operations
- In 2015 EPIM, Baker Hughes, Halliburton, Schlumberger, Weatherford, GCENODE representing National Oilwell Varco, Cameron, MHWirth agreed to establish a joint project organized by Norwegian Oil & Gas.

Objective:

- **Further develop of automation and remote operations starting with focus on standardization on data sharing, availability and information security**
- In March 2016 the pilot was presented to the Top Managers Forum for Oil Companies
- In January 2017 the pilot was presented to the Board of NOROG

Architecture for effective and secure information sharing



Objective and goals

Drilling & Production

- Improved collaboration and more effective decision making
- Increased sustainability & safety
- Reduced number of duplicated sensors
- Reduced engineering hours and improved sensor data quality
- Reduced drilling and operational costs
- Increased operational time & performance

HSE and Sustainability

- More operation from onshore
- Less helicopter and boat traffic
- Less CO2 footprint and less costs
- Less need for power supply

Engineering

- Effective data and information sharing through open protocols and information architecture
- Scalable and secure communication pathways across domains & firewalls
- Effective real-time analysis and visualization throughout the value chain

Maintenance

- Conditioned based maintenance
- Robust asset optimization and higher uptime

Many of the goals are also targeted in the recent Konkraft initiative

Standardization on data sharing, availability and information security

Recommendations 1:

- **Rig or onshore located Data Aggregation server (OPC UA)**
- **Supplier independent** solution focus
 - Establish a rig or onshore located OPC server (Object Process Control) with universal architecture (UA) data aggregation solution
- Suggested technology shall ensure safe data transfer and access through firewalls
- Hosted and managed **by an independent industry** body
 - **EPIM recommended**
 - Defines standards for data protocols and security.
 - Operated on a non-profit basis.
 - Access to data defined based in relevant contracts

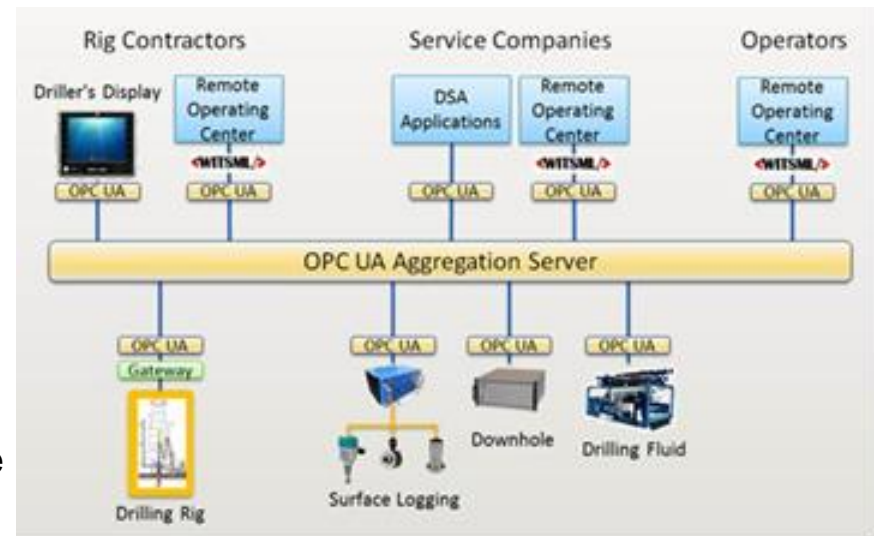
Standardization on data sharing, availability and information security

Recommendation 2:

Standardization of data/sensor sharing and availability

- Minimize sensor duplication.
- Develop semantic* data aggregation server

Note that current rig sensor packages should be possible to adapt to suggested solution



*Access to data using common terms

Data-set for the test pilot

Hoisting/Drawwork	Mud	Downhole	Operator Well Configuration Data (OWCD)
<ul style="list-style-type: none"> • Heave Comp On/Off • Block positioning • Block Velocity • Load* / Weight on hook • WOB (kalkulert) • Bit depth 	<ul style="list-style-type: none"> • Flow, inlet • Flow, outlet*** • Temp** (where?) • Active volume • Degasser (return)*** <ul style="list-style-type: none"> • Temp • Pressure 	<ul style="list-style-type: none"> • Motion reference unit (MRU for floating installations) • ROP** 	<ul style="list-style-type: none"> • Pore & pressure estimates • Torques & drag estimation • Casing Program
	<ul style="list-style-type: none"> • Density in/out*** • Viscosity**** 	<ul style="list-style-type: none"> • Depth (TVD) • WOB Service 	

■ = Top Side Data

□ = Service Data

■ = Operator Data

* = Quality requirements

** = One or more sources

*** = One or more sources

**** = Optional

Tripping	Rotating/T.Block	Pressure	Cementing
<ul style="list-style-type: none"> • Slips on/off • Elevator on/off 	<ul style="list-style-type: none"> • Torque • RPM 	<ul style="list-style-type: none"> • Stand pipe* 	
	<ul style="list-style-type: none"> • Bit-depth** 	<ul style="list-style-type: none"> • Stand pipe* • BHP (ECD) 	<ul style="list-style-type: none"> • Pump Flow • Pump Pressure • Tank volume

Pilot 1:

Virtual Pilot at IRIS

What

- Establish and demonstrate a “Drilling Data Highway” Real-time data aggregation hub
- Demonstrate integration and interfacing of topside and down-hole data using OPC-UA

How

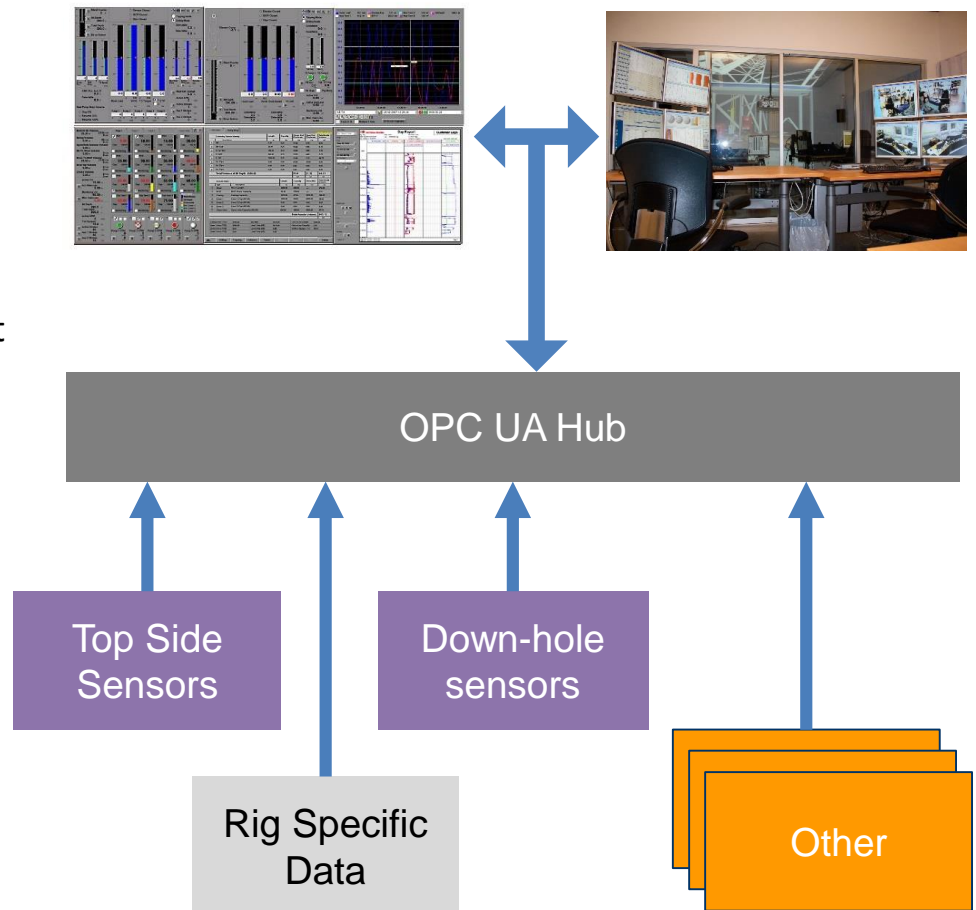
- Utilize the existing Virtual Rig infrastructure at IRIS (Statfjord C)
- Physical PLCs & downhole simulator
- Project to be completed in 6-months

Drilling Data Highway

- Top side and down-hole sensors
- Rig specific data

Benefits

- Short integration time and real sensors
- Realistic down-hole simulator
- Easy demonstration of connectivity



Pilot 2:

Virtual offshore platforms in drilling modus

- The objective for the pilots is to validate the preliminary OPC UA hub developed and tested at IRIS facilities
- The pilots will demonstrate multi-vendor integration between data providers and data consumers
- The pilots will require commitments from the involved parties
- Dialog is initiated with relevant companies



Linking technologies and the market needs



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