



Evaluating Innovation Technologies: Organizational capabilities

Asgeir Drøivoldsmo,
Institute for Energy Technology, Norway

IFE Research and Development

Digital Systems



Control room and Interaction Design

Virtual and Augmented Reality

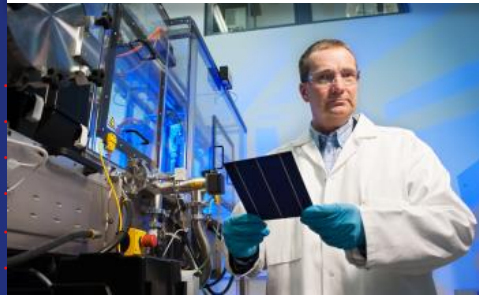
Intelligent Systems

Automation and User Monitoring

Risk, Safety and Security

Human Centred Digitalization

Material and Process Technology



Solar Energy

Battery Technology

Renewable Energy Systems

Neutron Material Characterization

Computational Materials Processing

Environmental Industrial Processes

Fluid Flow and Environmental Technology



Flow Technology

Wind Energy

Corrosion Technology

Tracer Technology

Environmental Analysis



IFE's vision:
Internationally leading research institute

Turnover:

120

Mill \$



Annual publications:

>140



1948: IFA



1980: IFE

Employees:

600



14.000



Annual visitors

Advanced laboratories:

24



Nationalities: 32

Researchers: 207

PhDs: 105

Centres for renewable
energy:

2



International projects:

> 30%



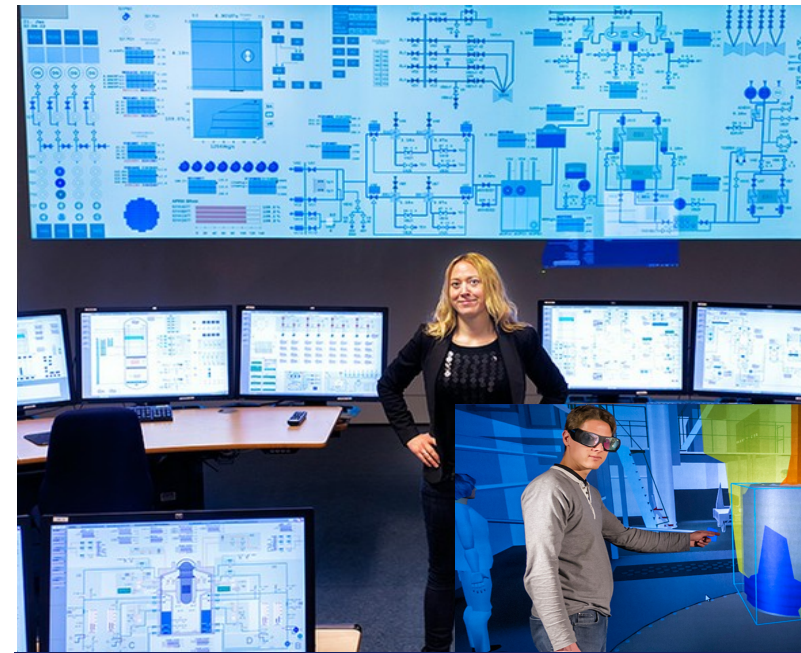
Our history



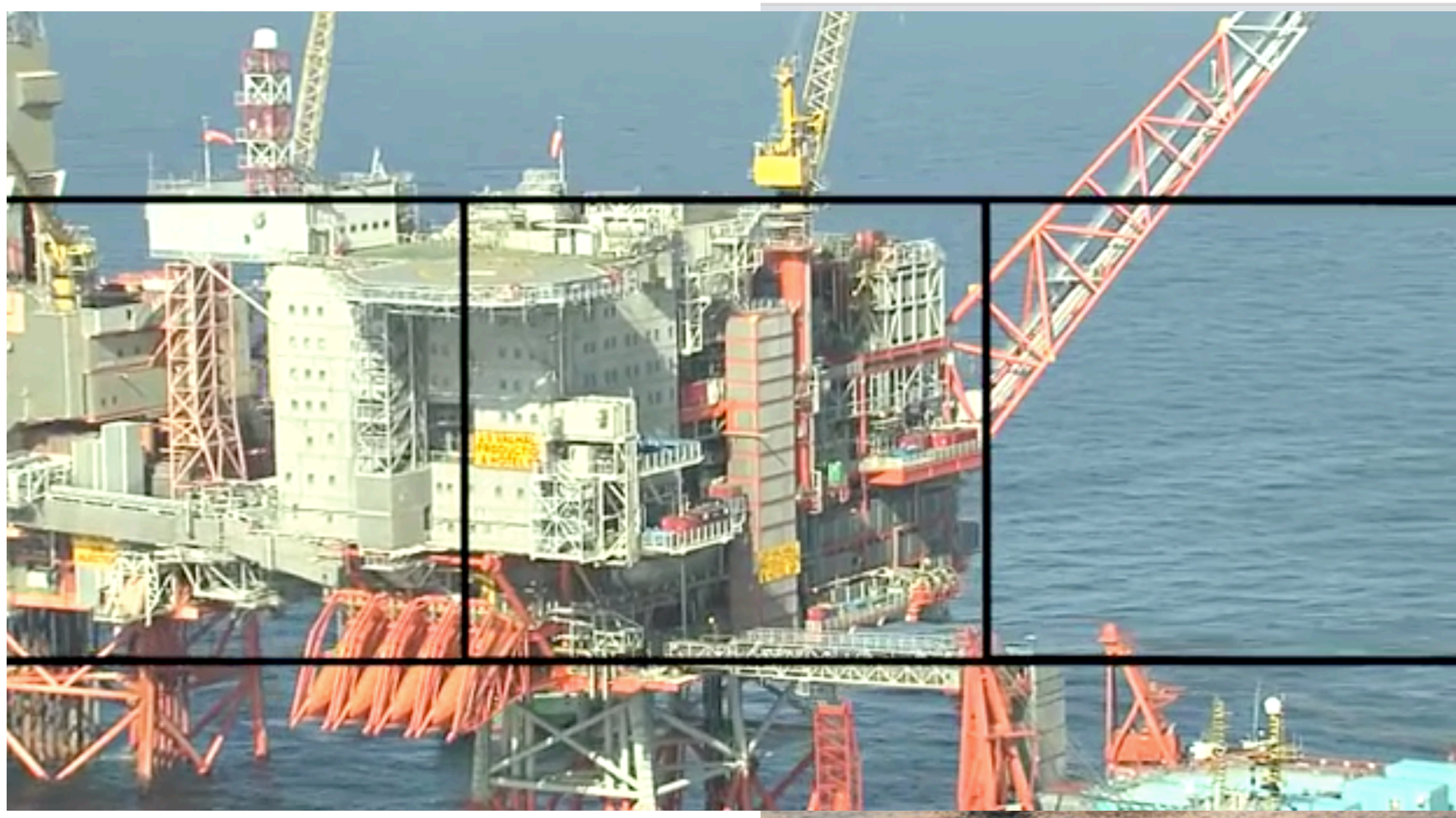
Gunnar Randers, the first CEO of IFE og primus motor behind establishing the nuclear test reactor in Halden, with Albert Einstein, 1939



Gunnar Randes established IFE in 1948. IFE became host of the Halden Reactor Project in 1958, an international R&D collaboration with 20 countries.

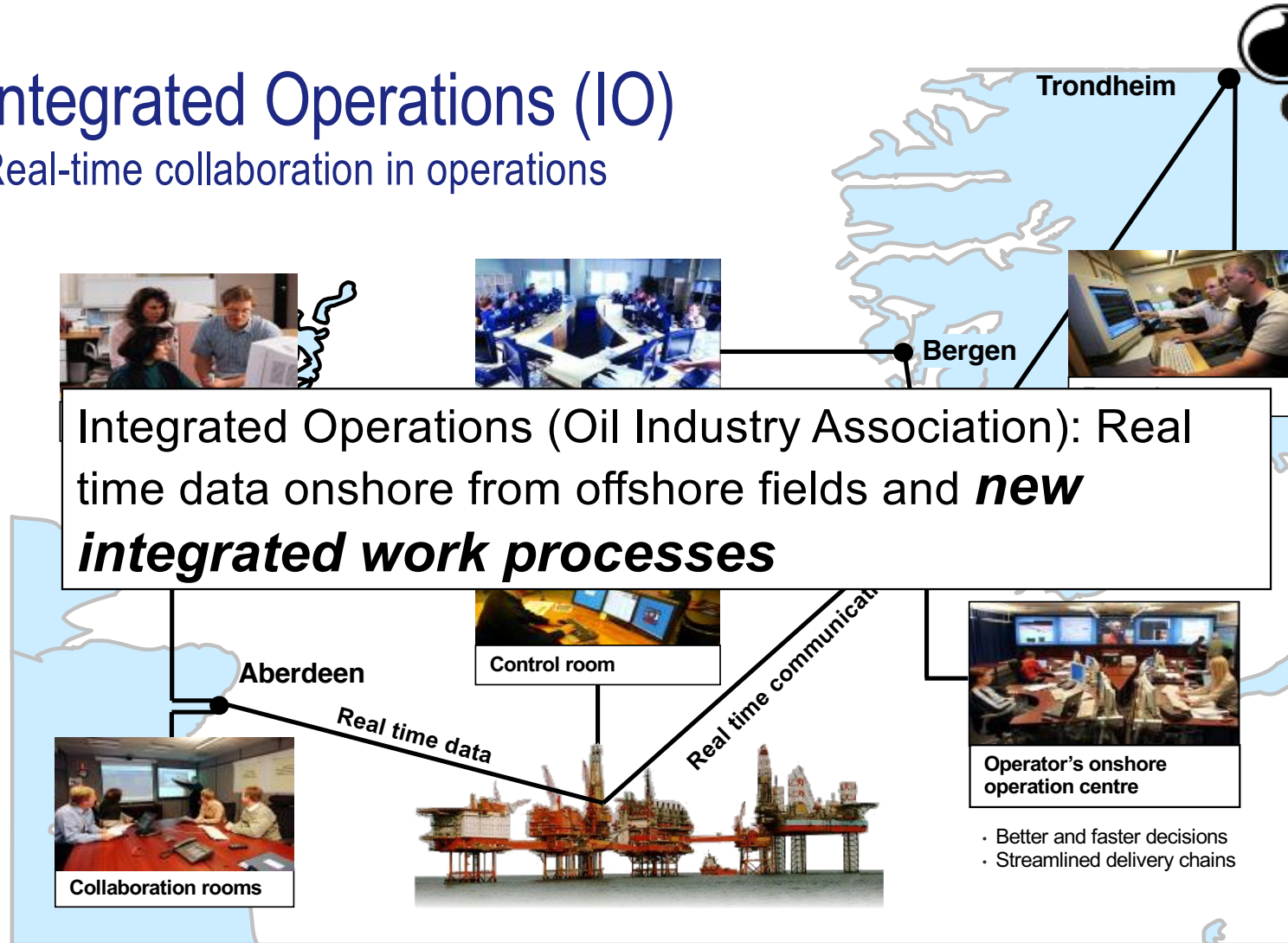


Our research on human strengths and limitations in process control has a strong empirical focus.



Integrated Operations (IO)

Real-time collaboration in operations



Integrated Operations (Oil Industry Association): Real time data onshore from offshore fields and **new integrated work processes**

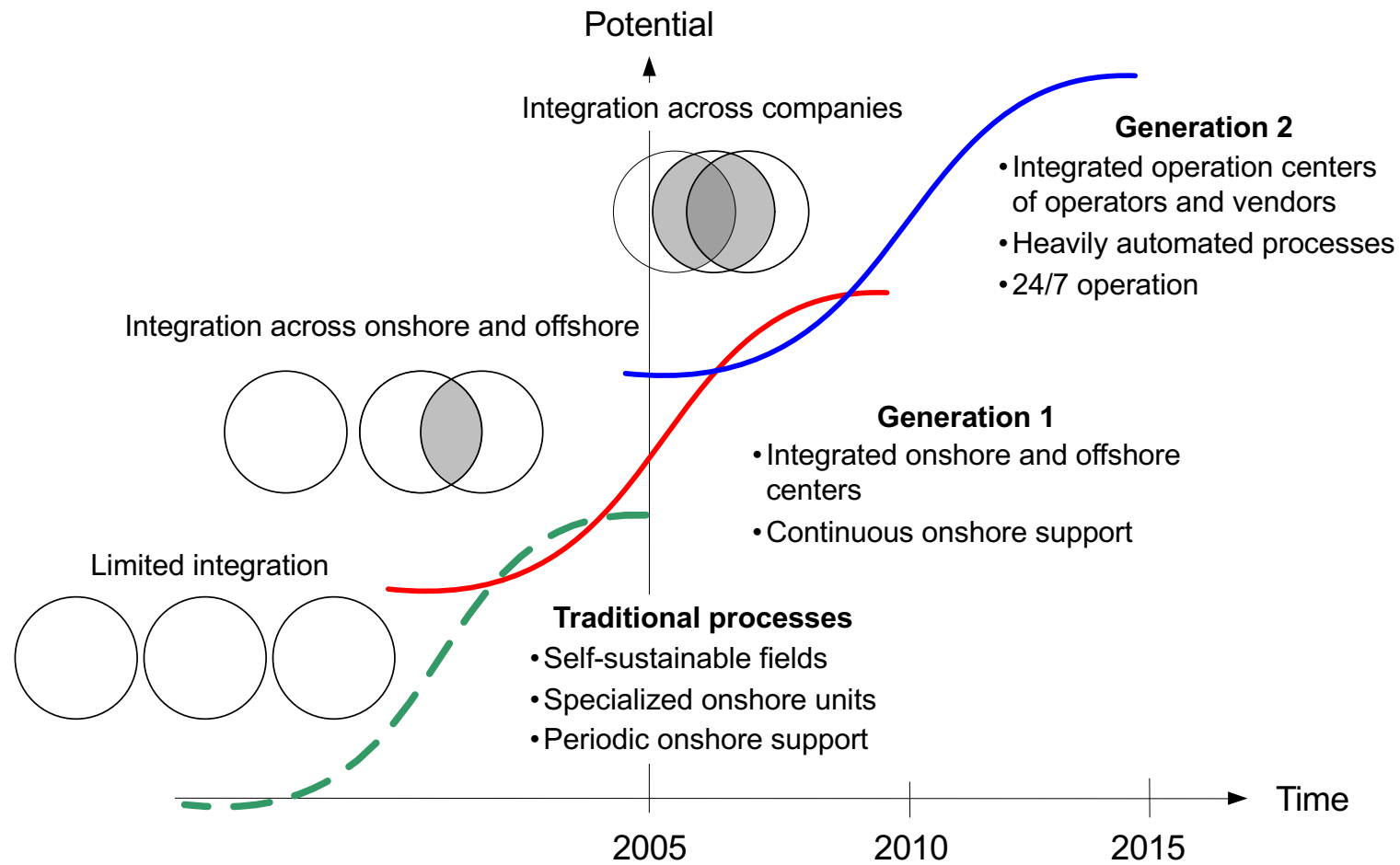


Operator's onshore operation centre

- Better and faster decisions
- Streamlined delivery chains

Integrated Work Processes

Norwegian Oil Industry Association (2005)



RESEARCH PARTNERS



Industrial partners in the Center for Integrated Operations in the Petroleum Industry:



Collaborating international academic partners:



2006– 2014 Cross industry research initiative

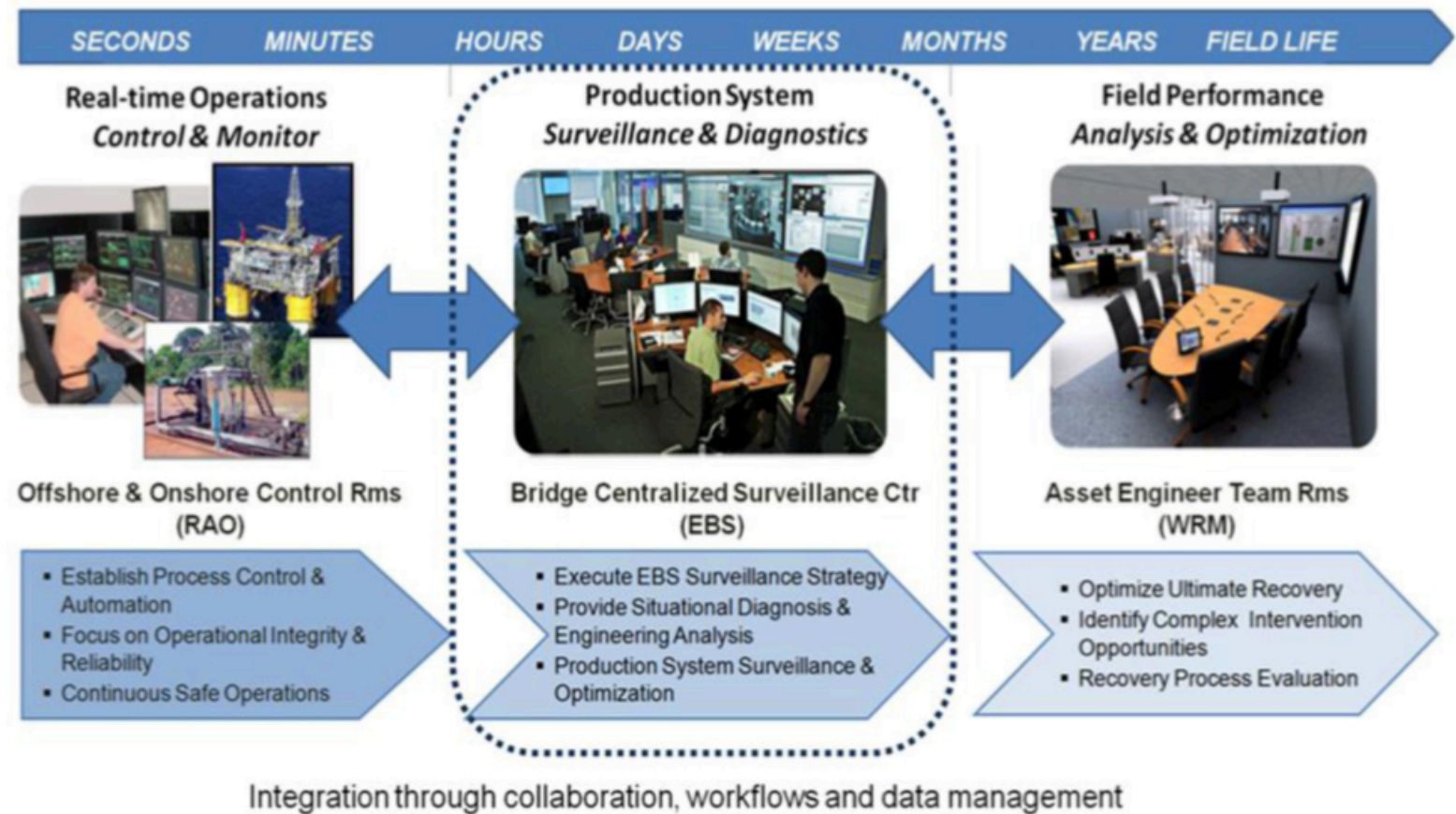
Virtual organizations

Co-location of engineering and operations support across utilities

Multi-utility service and maintenance teams

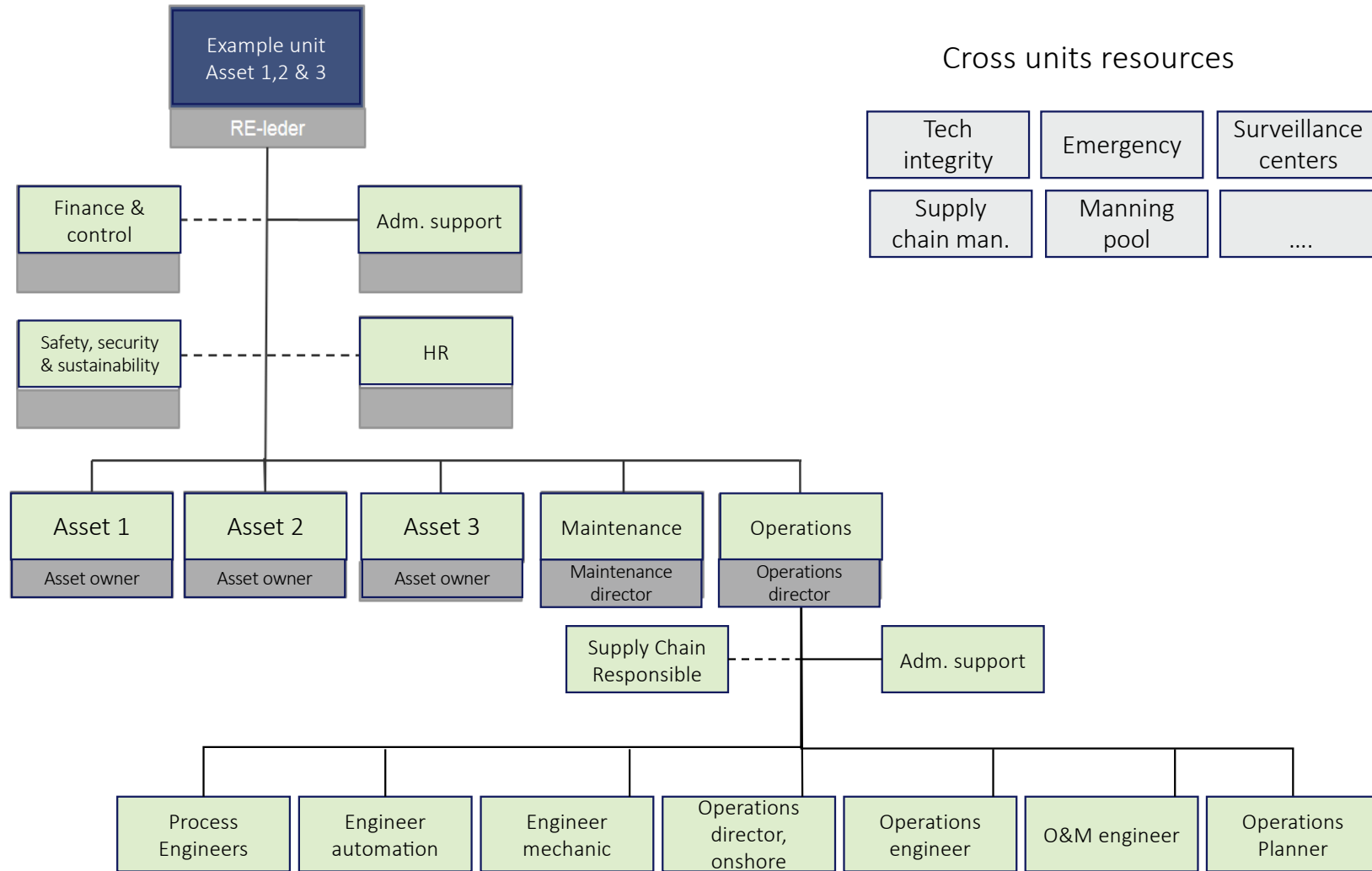
Multi-utility Campaign maintenance models

Collaboration models for centralized administrative functions



From Drøivoldsmo 2016 and Van den Berg 2015

Example of oil onshore organisation



Digitalisation changes the Way of Working

Serial	<p><i>General development</i> More and faster collaboration and information transfer across geographical, discipline and organisational boundaries, and between different persons</p> <p>(Source Ringstad & Andersen Statoil)</p>	Same time (Coordinated)
Single discipline		Multidiscipline teams
Dependent of physical location		Independent of physical location
Decisions based on experience data		Decisions based on realtime data
Reactive		Proactive

To start using new technology demands development of the organisation...



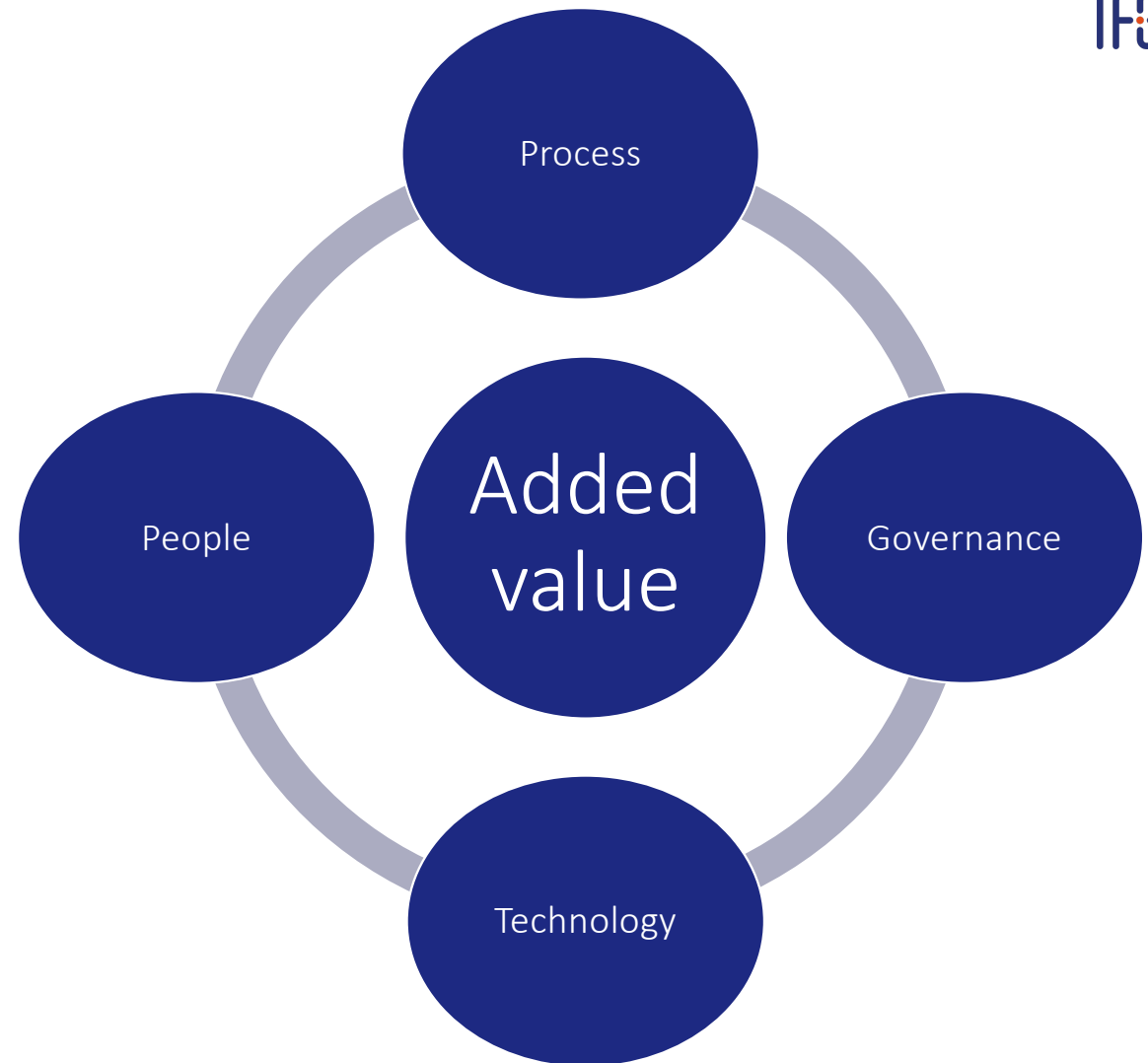
- Redefining the work tasks and need for competency
- Changing the work arena
- Challenging professional pride
- Challenging "established truths"
- Exposing the individual more in everyday work

- To be successful in implementation of new ways of working require redefinition of the **operation models**

Capability – what is it?

Capability refer to the combined capacity and ability to plan and execute in accordance with the targeted business objective(s)

- Through the designed combination of people, processes, technology, governance/organization
- In interaction with the environment



Success criteria

Identified aspects are described for each of the 7 integrated operations success criteria

Aspect examples:

Day to day operations

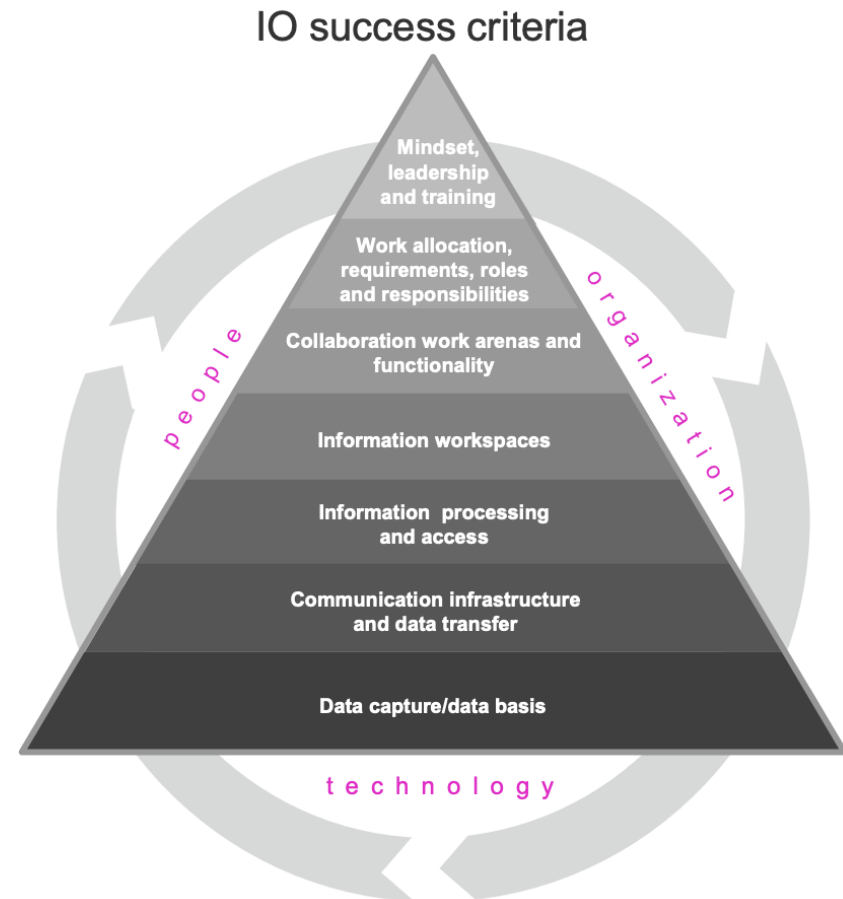
Operation planning

Contractor cooperation

Modification projects

Environmental surveillance

M T and O are solved for each success criterion



Stack model capability platform

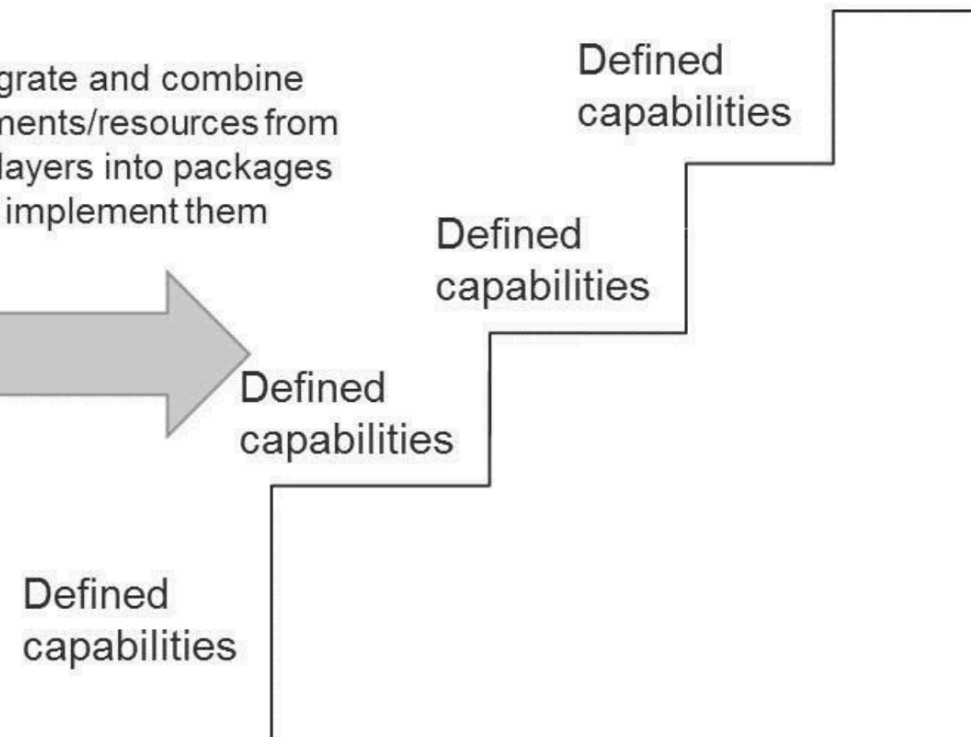
Resource stack



Integrate and combine elements/resources from the layers into packages and implement them

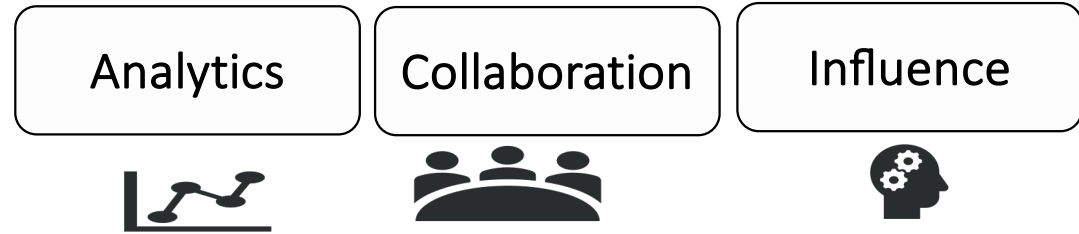


Capability stack



How?

Identification and development of the capabilities the company needs to meet business objectives



Business requirements

Establish visions
Prioritize capabilities

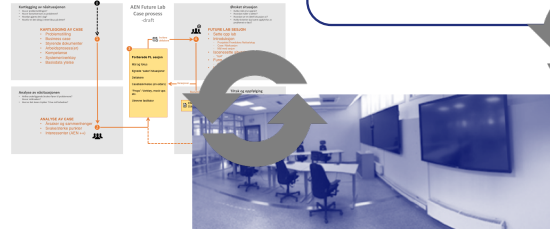
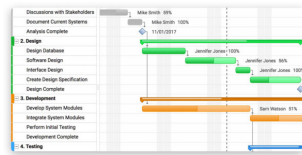
Define capabilities

Test definitions

Develop plan

Translate to maturity matrix

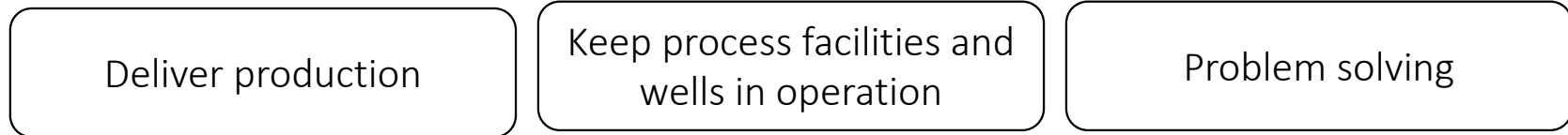
Define capability requirements



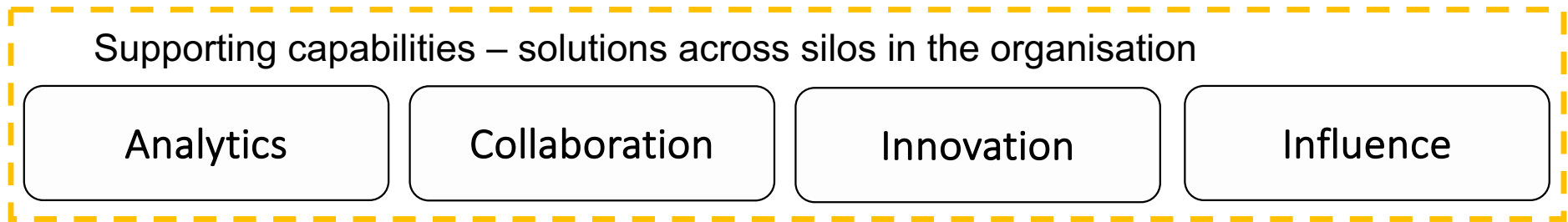
People	Technology	Processes	Governance	Maturity level
Empowered personnel utilizing continuous improvement and innovation in terms of technology, processes, data for enabling a new way of working. The total system is mature.				5
Able to use ASP in strategic (2nd and 3rd) processes. Personnel are comfortable with the capabilities and able to "break the box".				4
Distribution of ASP in the organization is only set.				3
In control of and actively using ASP where it really does work.				2
Able to use parts of ASP in many day work. Use of collaboration tools, knowledge of business tools.				1



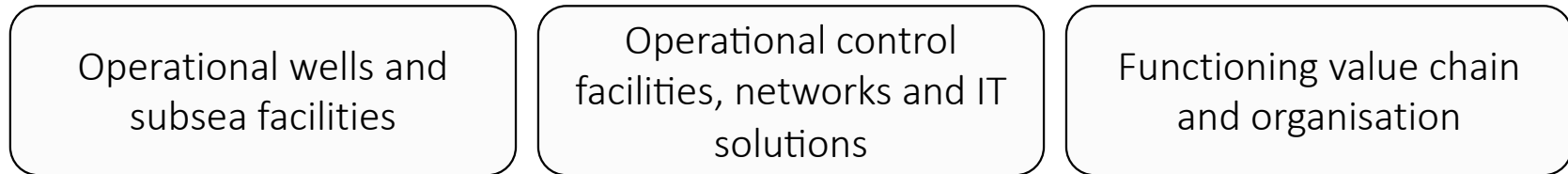
Operational capabilities



Supporting capabilities – solutions across silos in the organisation



Foundational capabilities



Requirements for analytics capability

Menneske	Prosess	Organisasjon	Teknologi	Modenhetsnivå	
				5	<p>Goal</p> <p>Establish data analysis as a standardized way of work in the organization</p>
				4	
				3	
				2	
				1	

The organization is capable of continuous improvement and development of analysis tools, processes and expertise

*Able to use analysis data to predict (future) performance
Personnel are comfortable with analysis and start thinking "outside the box"*

Standardization of working methods in the organization that utilizes analysis where it gives profit

Utilize analysis actively where it is suitable for problem solving in the local department

Able to use analytics in practical deliveries (use dashboards and tools from the physical location where work is performed).

One department

Starts the Daily production optimization meeting

The screenshot shows a web application interface for a 'Daily Production Optimization Meeting'. The interface is divided into several sections:

- Header:** 'Daily Production Optimization Meeting' with date '9/27/2008' and time '12:30 PM - 1:00 PM'. Location is 'Conference Room 8'.
- Left Sidebar:** A date selector with a list of dates from 9/24/2008 to 10/8/2008. The current date, 9/27/2008, is selected.
- Main Dashboard:**
 - Troll felt key data:** A section titled 'Troll B Trendplott' showing a line chart with multiple data series (red, blue, green) over time. Below it is a 'Troll B Hakkeldata' section with a bar chart and a 'Troll B Historikk' section with a stacked bar chart.
 - Objective:** A section titled 'Objective' with the text 'Discusse production increasing initiatives in order to get maxim production'.
 - Agenda:** A table with columns 'Subject' and 'Owner'.

Subject	Owner
Discuss Well capacities and status	Nils
Discuss Process capacities	Nils
Discuss Capacity constrains	Didrik, Frida
Planned activities	Didrik
Other	
 - Attendees:** A table with columns 'Name', 'Edit', and 'Response'.

Name	Edit	Response
Per		Accepted
Nils		Accepted
Frida		Accepted
Didrik		Accepted
- Action List:** A table with columns 'Category', 'Object', 'Description', 'Start Date', and 'Status'.

Category	Object	Description	Start Date	Status
Well	M12	Well test	9/27/08 07:30	Not started
- Document Library:** A section titled 'Document Library' with a table for 'Type', 'Name', and 'Modified By'. It contains the text: 'There are no items to show in this view of the "Document Library" document library. To create a new item, click "Add new document" below.'

An anomaly is discovered

Problem detection and resolution



An expert must be contacted

Well A6 information screen

Part	Manufacturer	Startup date
XYZ	Siemens	2000/01/05
		2002/02/03

Create action for Well A6: Pressure sensor

Action description:

- Survey
- Replace
- Adjust

Due by: 2008/06/06

OK

This is a known problem...

An action is created...

Potential challenges to improving collaboration

Technology



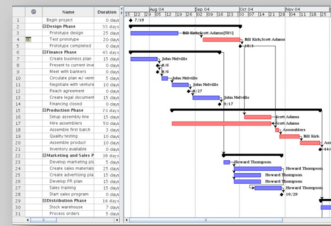
Connections
 Security
 Availability
 Functionality
 Maintenance
 Compatibility

People



Competence
 Common goals
 Understanding of
 roles,
 responsibilities
 and needs
 Trust

Process



Aligning
 processes
 Necessary
 support
 processes

Governance



Contracts
 Commitment
 Incentives
 Structures

Efficient and effective meetings

- All regular meetings are held to meet a need in the established work process
- Only people who will contribute directly to the meeting's purpose are called. Others are informed (before and/or after).
- Emerging issues outside the agenda or relevant to only a small subset of participants are transferred to a follow-up meeting. Urgent and important is not the same as belonging in *this* meeting
- Decisions, actions and significant information points are concurrently written down on a shared screen, and these are swiftly reviewed and agreed upon before the meeting adjourns. Actions always with date and owner. Save and send to all stakeholders as people get ready to leave the room.
- Evaluate the meeting and the meeting's purpose regularly: Is the meeting producing what we want? Do we still want the same?



Clear meeting owner



Shared understanding of meeting purpose and scope



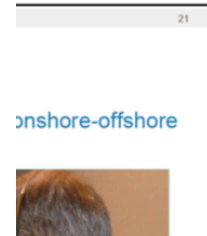
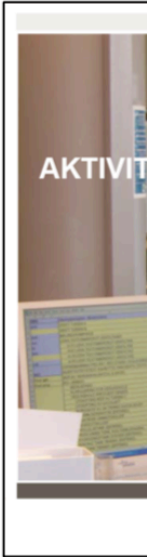
Fixed agenda



Shared work surface



Evaluate meeting regularly



22

New IO work-process
Transfer of "Live" video to technical expertise onshore

- Contributing to effective problem solving and decision making
- Reduce the need of bringing vendors to the platform. They meet in the collaboration room instead of heliport....

Challenge: Extend the VW coverage to more platform modules/areas

StatoilHydro

Transfer of "Live" video to technical expertise onshore

Grane Pilot - 22 Transmitters in the Well Head Area and on heat exchangers

13

PLAUSIBLE

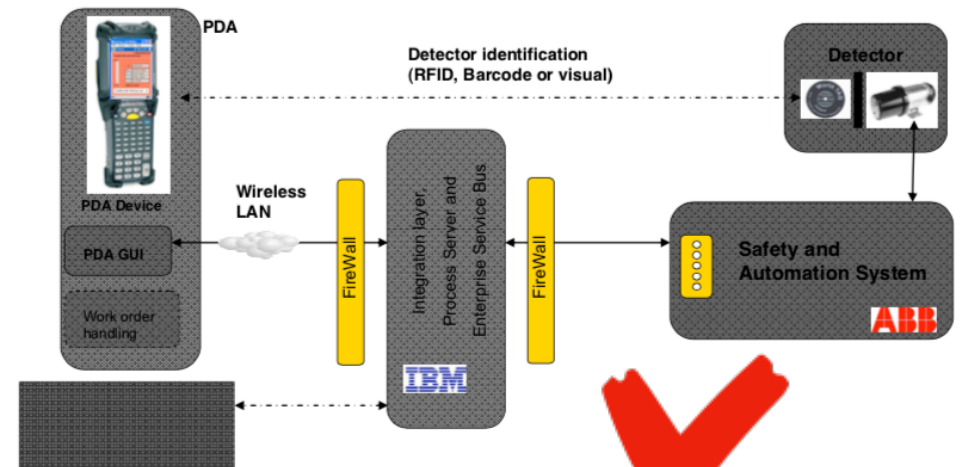


StatoilHydro

Wireless sensors and CCTV surveillance of equipment

Fire and Gas testing from handheld equipment

Main components in F&G Solution



© ASTI-5

ABB SKF
StatoilHydro IBM
AkerSolutions

What went **well** and what went wrong?



First generation

- Fiber optics
- Transformation from stand alone self supplied platforms to integrated offshore – onshore organizations
- Standardization of roles and processes across fields and onshore organization
- Reduction of expensive offshore administration hours
- Improved use of competence across the organisation – function reallocation according to competence

Second generation

- Integrated logistics planning and emergency response
- Established long loop planning, production optimization and maintenance processes with use of "right time" field data
- Multifield modification and maintenance concepts – e.g. campaign models
- Multifield operation groups (onshore day to day operations)

What went well and what went **wrong**?



- Early investments in too advanced technology, often immature and not fit for purpose
- Short loop operational support centers – help desk function for sharp end problem solving
- All inclusive corporate engineering support software
- Smart gadgets (most types of handheld devices)
- Underestimating needs for collaboration training
- Classroom training of practical people instead of on the job training
- Cross training all in one operator (Process, Automation, Electrician and Mechanic)

Even well founded measures do not always lead to success

Support centres as 24/7 landbased «helpdesks» :

- Collecting the best expertise in one location
- Letting these experts gather experience across fields, and with a sufficient number of cases to maintain their competence and experience on a very high level
- Each platform calls in when they encounter issues that require expert advice



BUSTED

Support centres focusing on longterm predictive :

- Access to detailed right time data accross fields
- Collecting the best expertise in one location
- Letting these experts gather experience across fields, and with a sufficient number of cases to maintain their competence and experience on a very high level
- The centre contacts the fields when they observe trends that may need to be dealt with



PLAUSIBLE

Thank you for your attention

Questions?

Asgeir Drøivoldsmo

Principal Research Scientist, PhD, Industrial psychology
Institute for Energy Technology
• Norway