Evaluating Innovation Technologies: Organizational capabilities

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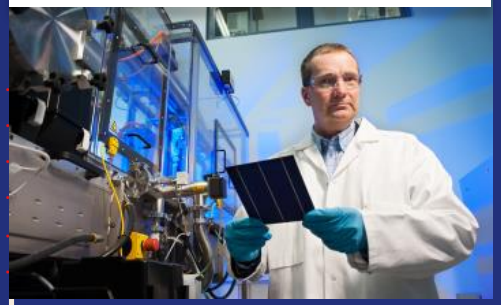
IFE Research and Development

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

IFE's vision:
Internationally leading research institute

Turnover:
120
Mill $

Annual publications:
>140

1948: IFA
1980: IFE

Employees:
600

Nationalities: 32
Researchers: 207
PhDs: 105

14.000
Annual visitors

Advanced laboratories:
24

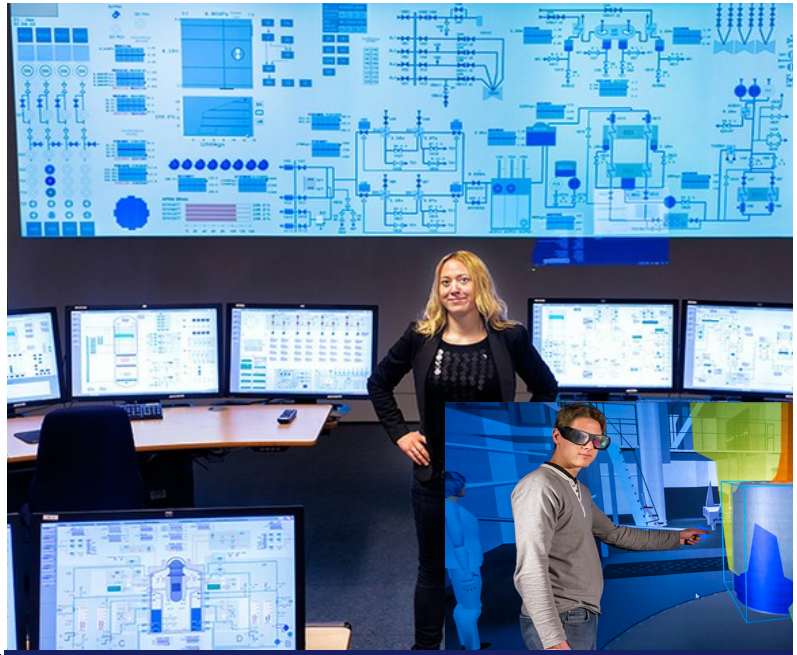
Centres for renewable energy:
2

International projects:
>30%

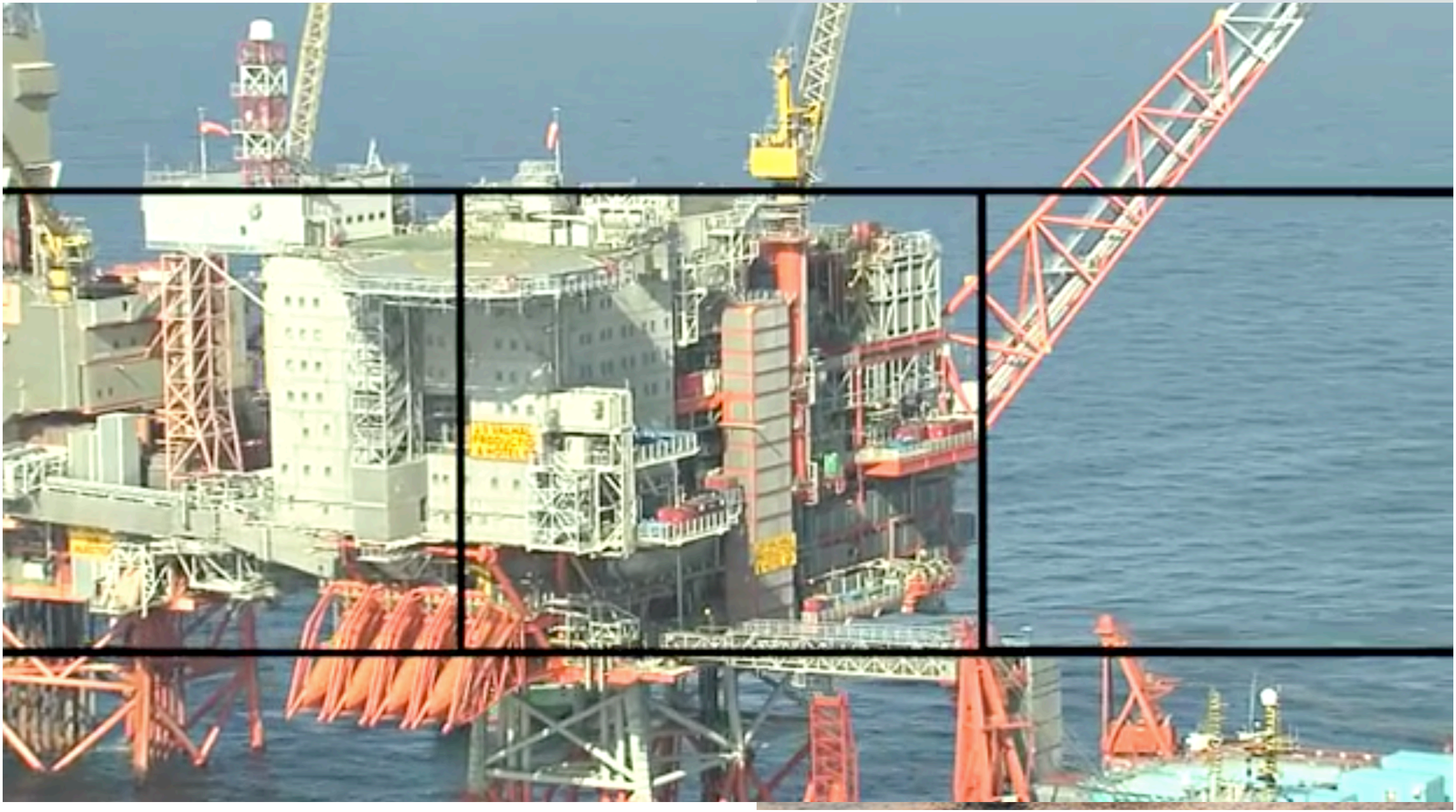
Our history

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.

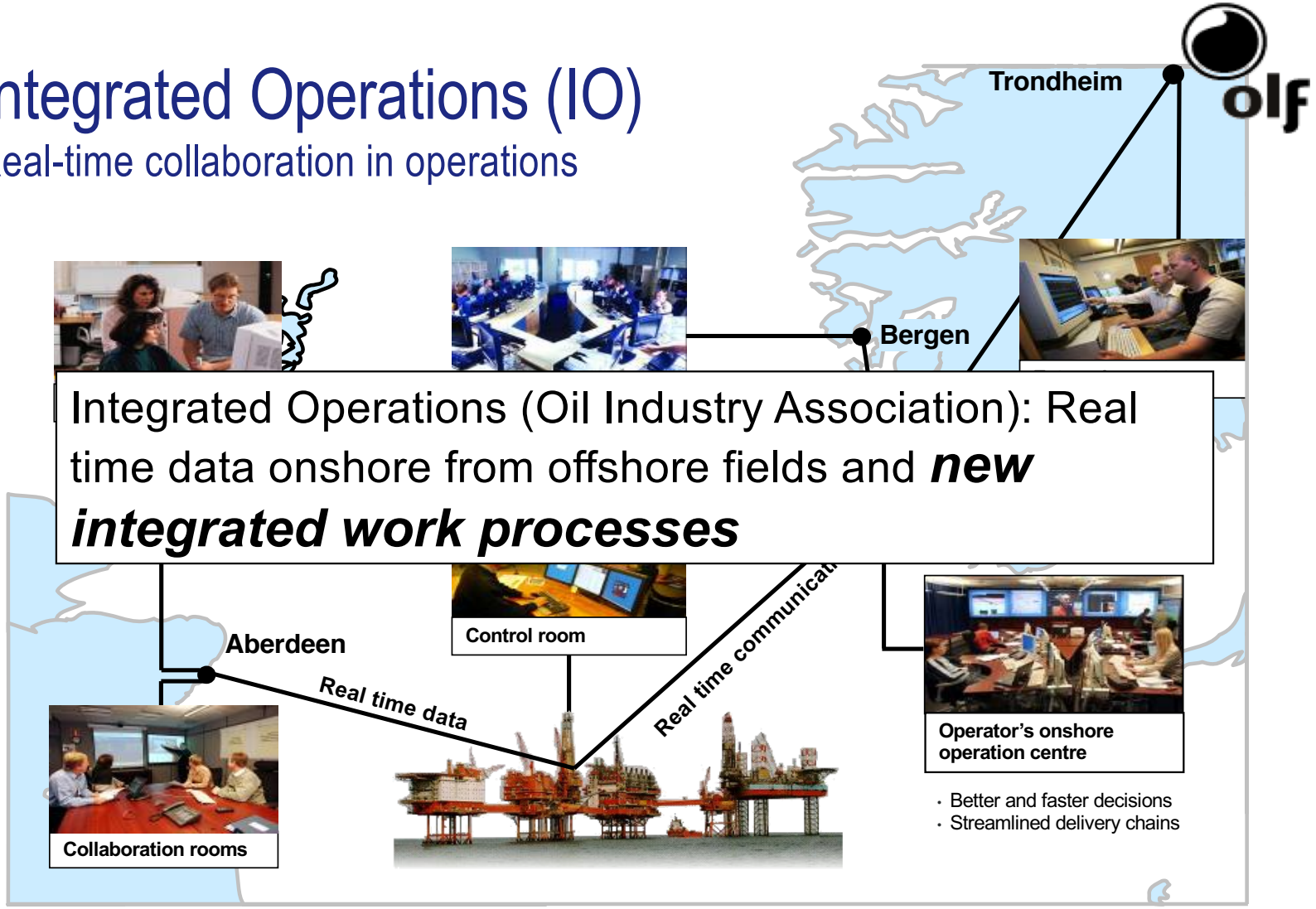


Our research on human strengths and limitiations in process control has a strong empirical focus.



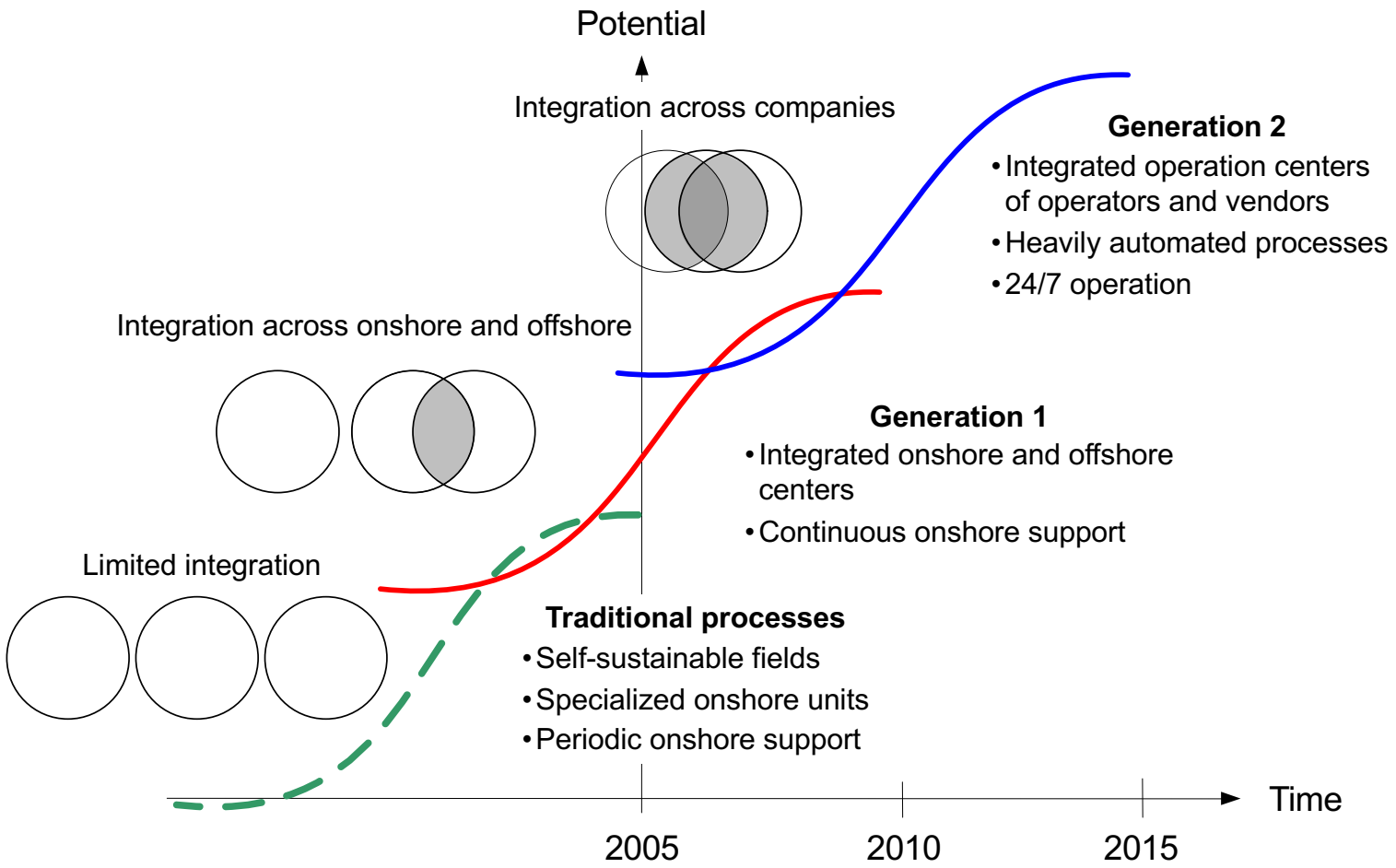
Integrated Operations (IO)

Real-time collaboration in operations



Integrated Work Processes

Norwegian Oil Industry Association (2005)



RESEARCH PARTNERS

Institute for Energy Technology

NTNU
Innovation and Creativity

SINTEF

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

PETROBRAS

Statoil

TOTAL

GDF SUEZ

ConocoPhillips

Eni Norge

KONGSBERG MARITIME

FMC Technologies

AkerSolutions

IBM

DNV

SKF

Collaborating international academic partners:

STANFORD UNIVERSITY

TU Delft

Carnegie Mellon

MINES ParisTech

UNIVERSIDADE FEDERAL DE SANTA CATARINA

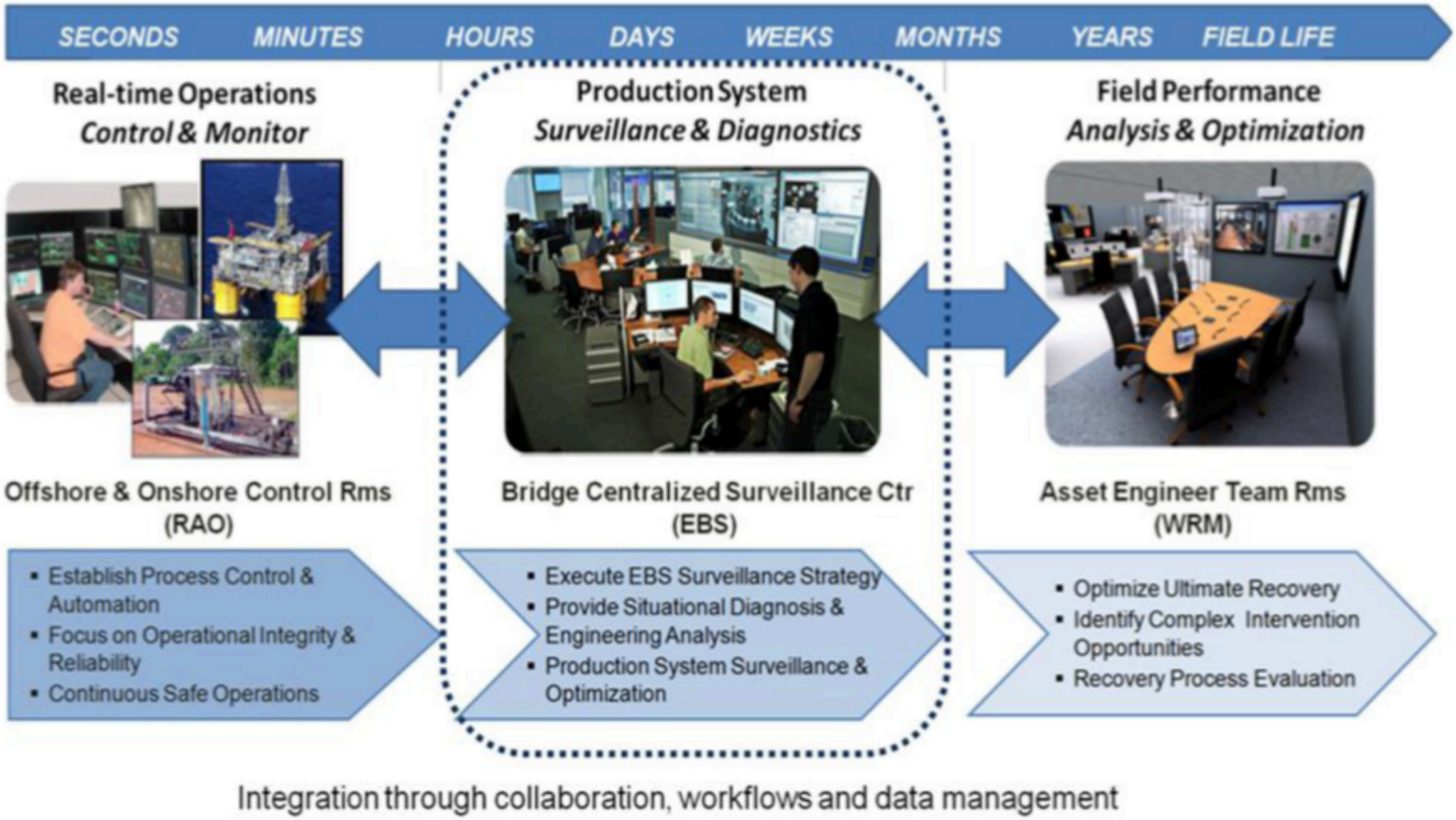
UNIVERSITY OF CENTRAL FLORIDA

BOSTON UNIVERSITY

2006– 2014 Cross industry research initiative

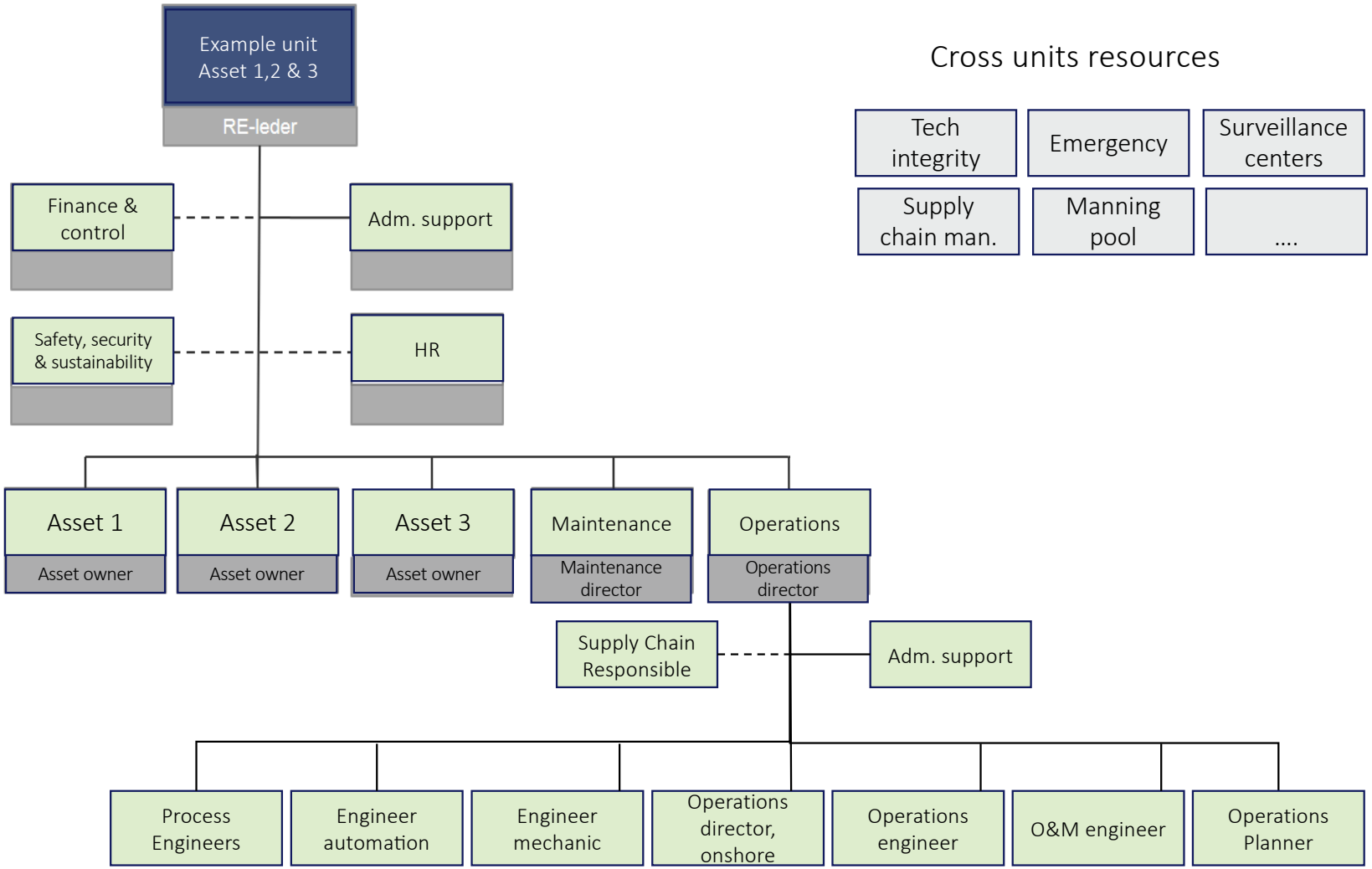
Virtual organizations

- Co-location of engineering and operations support accross utilities
- Multi-utility service and maintenance teams
- Multi-utility Campaign maintenance models
- Collaboration models for centralized administrative functions

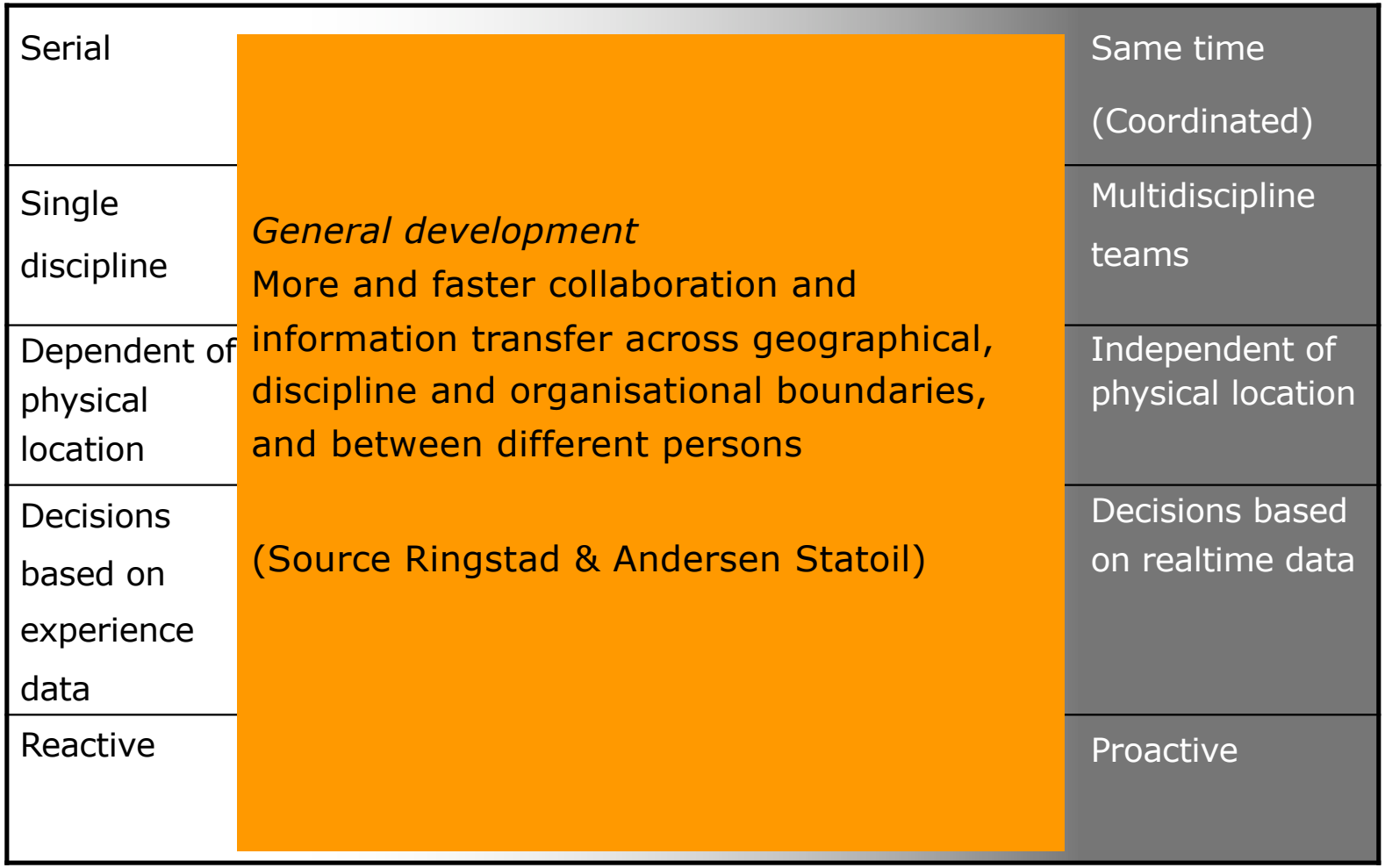


From Drøivoldsmo 2016 and Van den Berg 2015

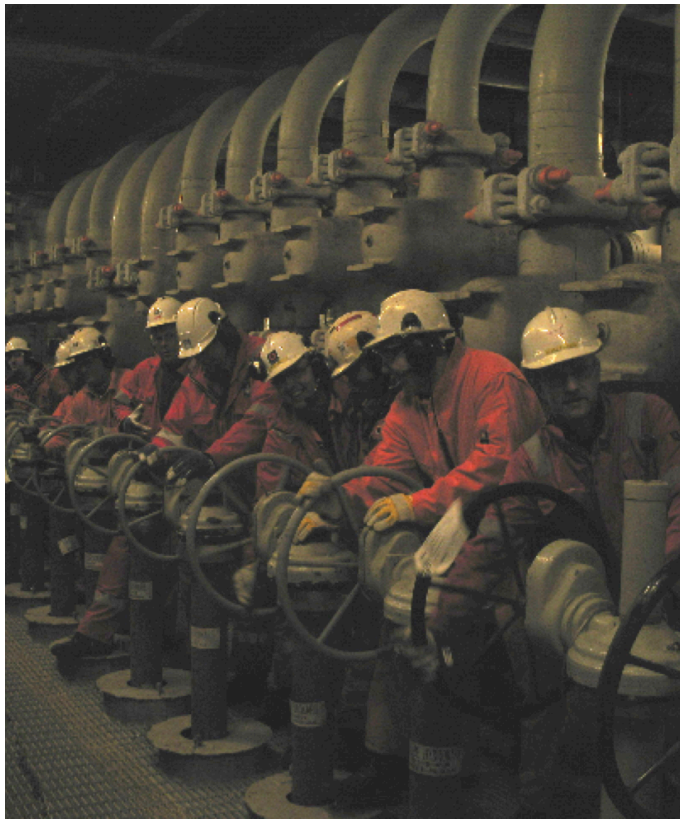
Example of oil onshore organisation



Digitalisation changes the Way of Working



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 everday work

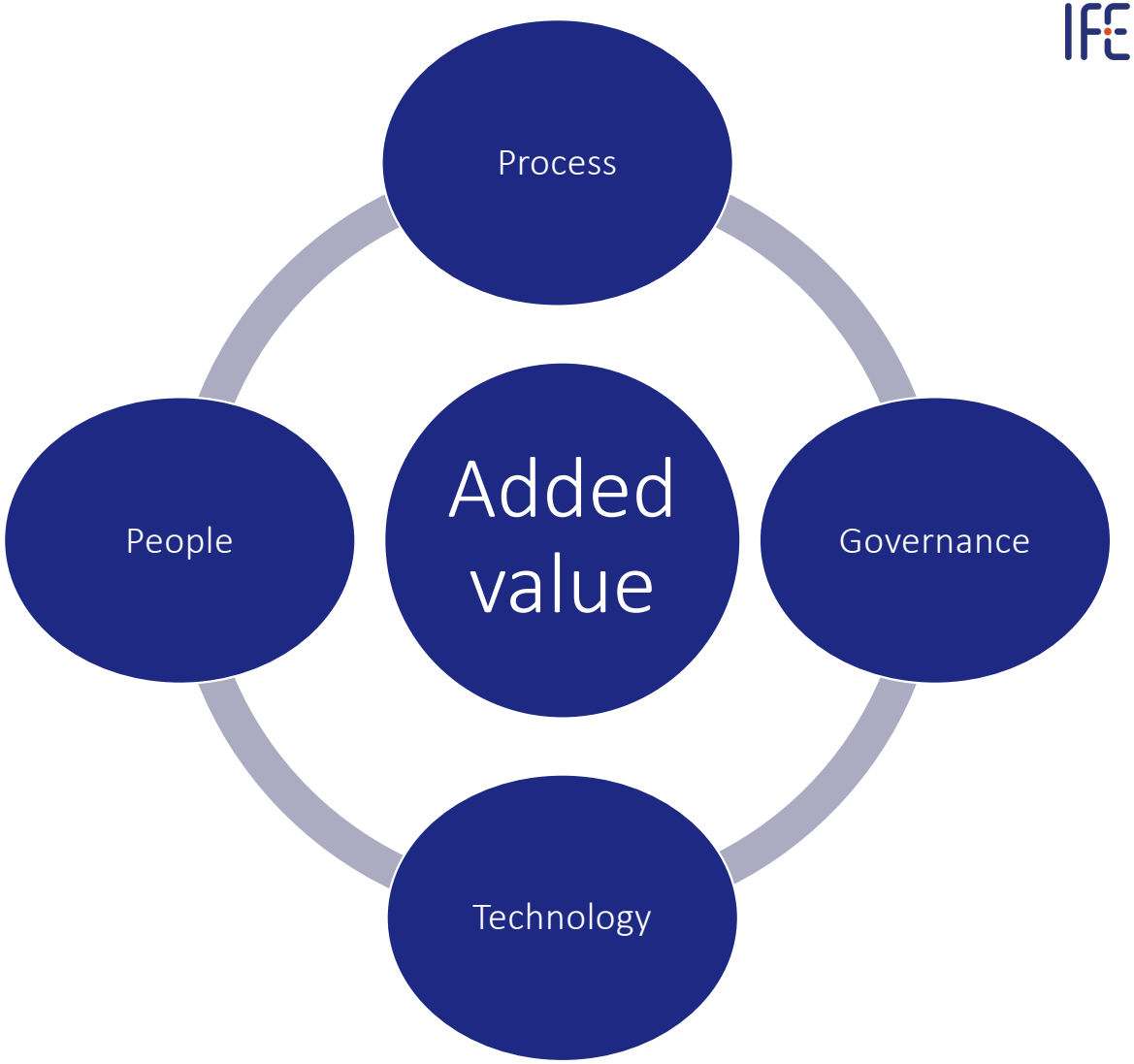
- To be successful in implementation of new ways of working require redefinition of the **operation models**

Based on: Bjørn Øystein Holst og Vidar Olaf Eriksen - Hydro

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

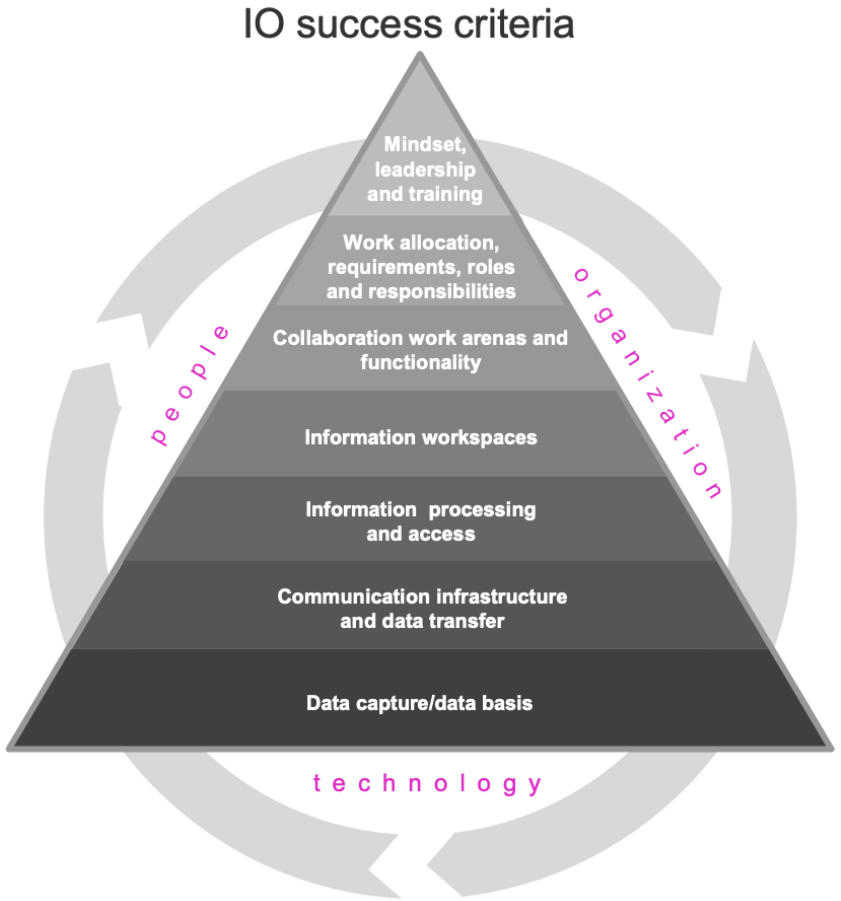
Operation planning

Contractor cooperation

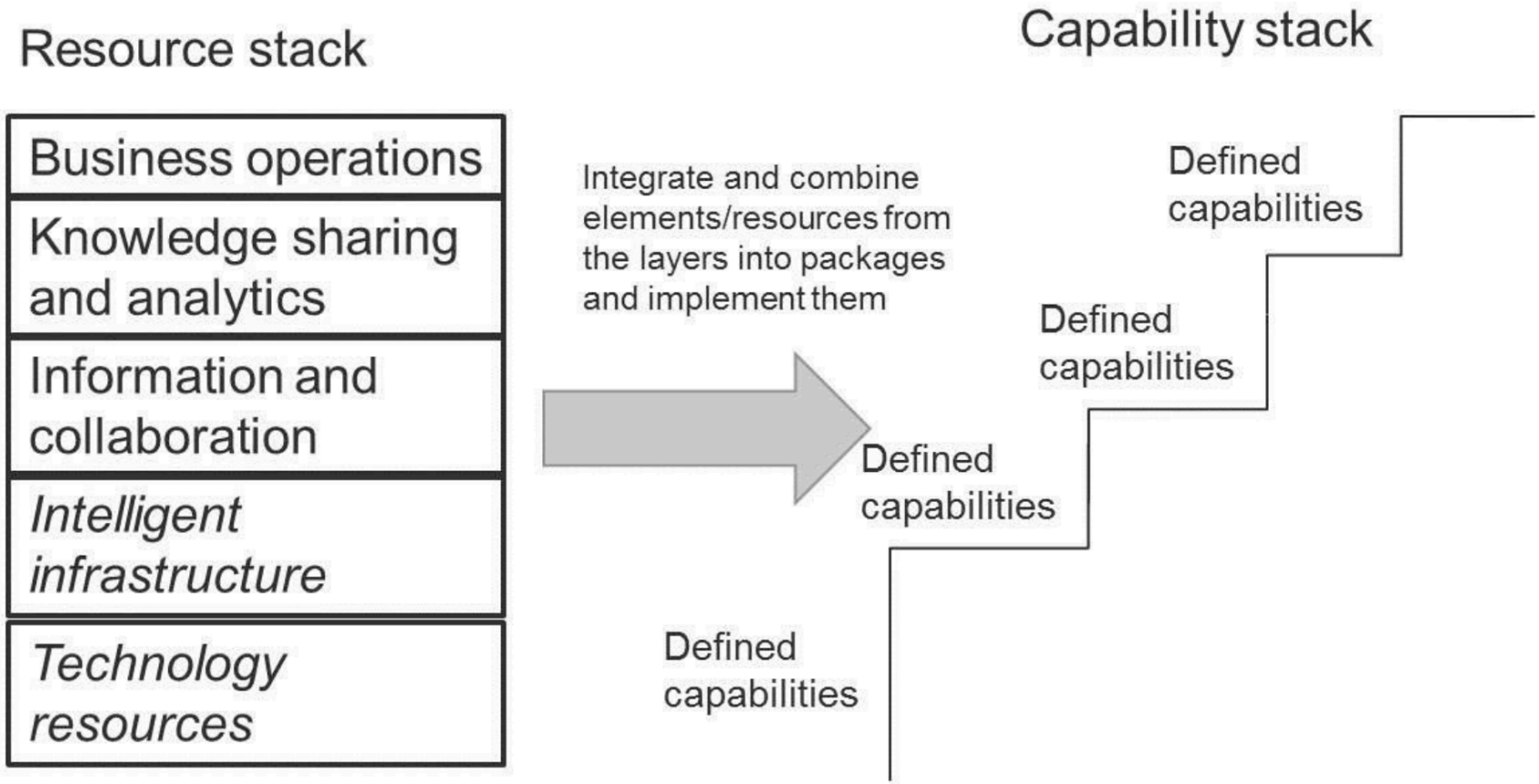
Modification projects

Environmental surveillance

M T and O are solved for each success criterion



Stack model capability platform



How?

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

Analytics

Collaboration

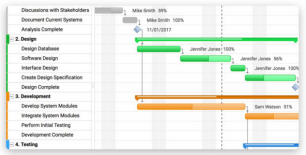
Influence

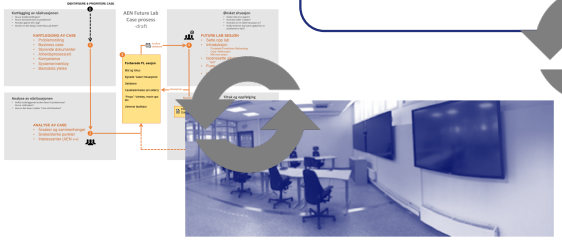
Business requirements

Establish visions
Prioritize capabilities

Define capabilities

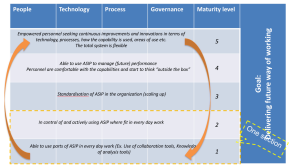
Test definitions



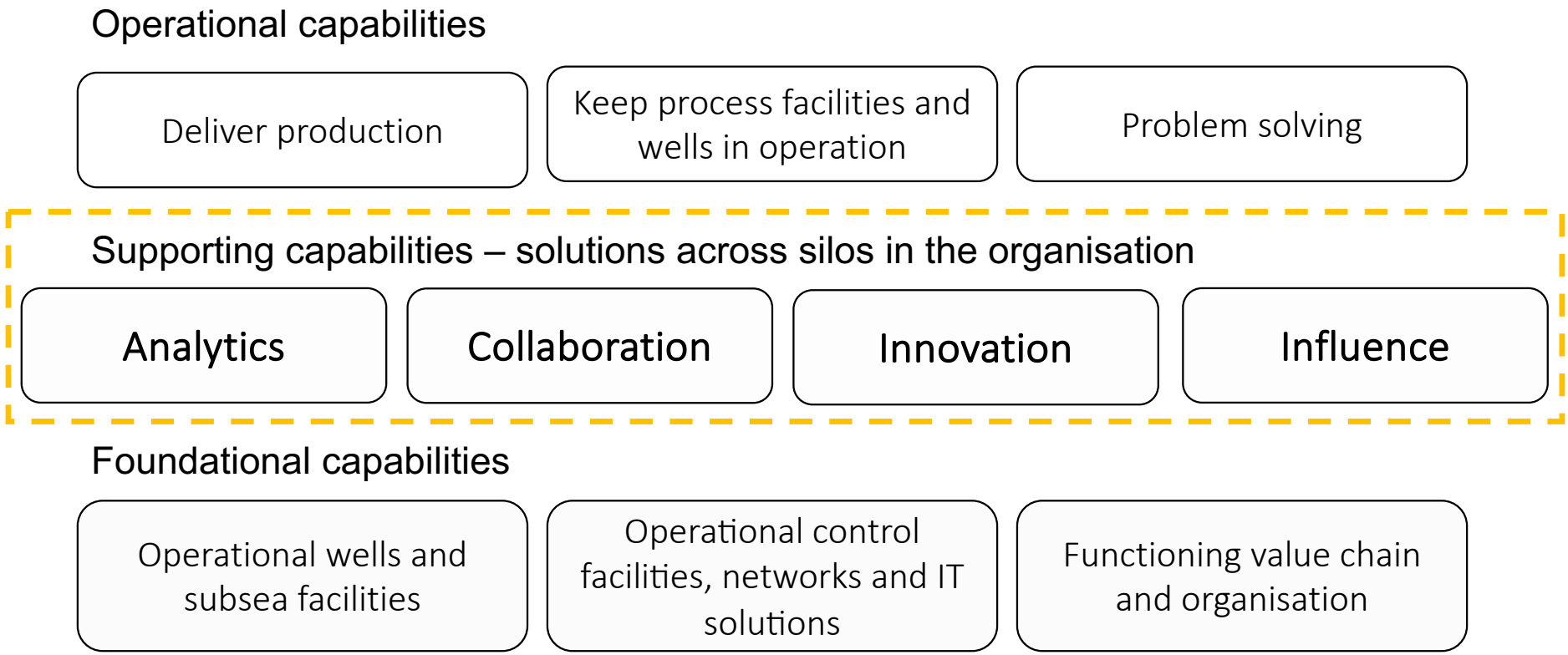


Define capability requirements

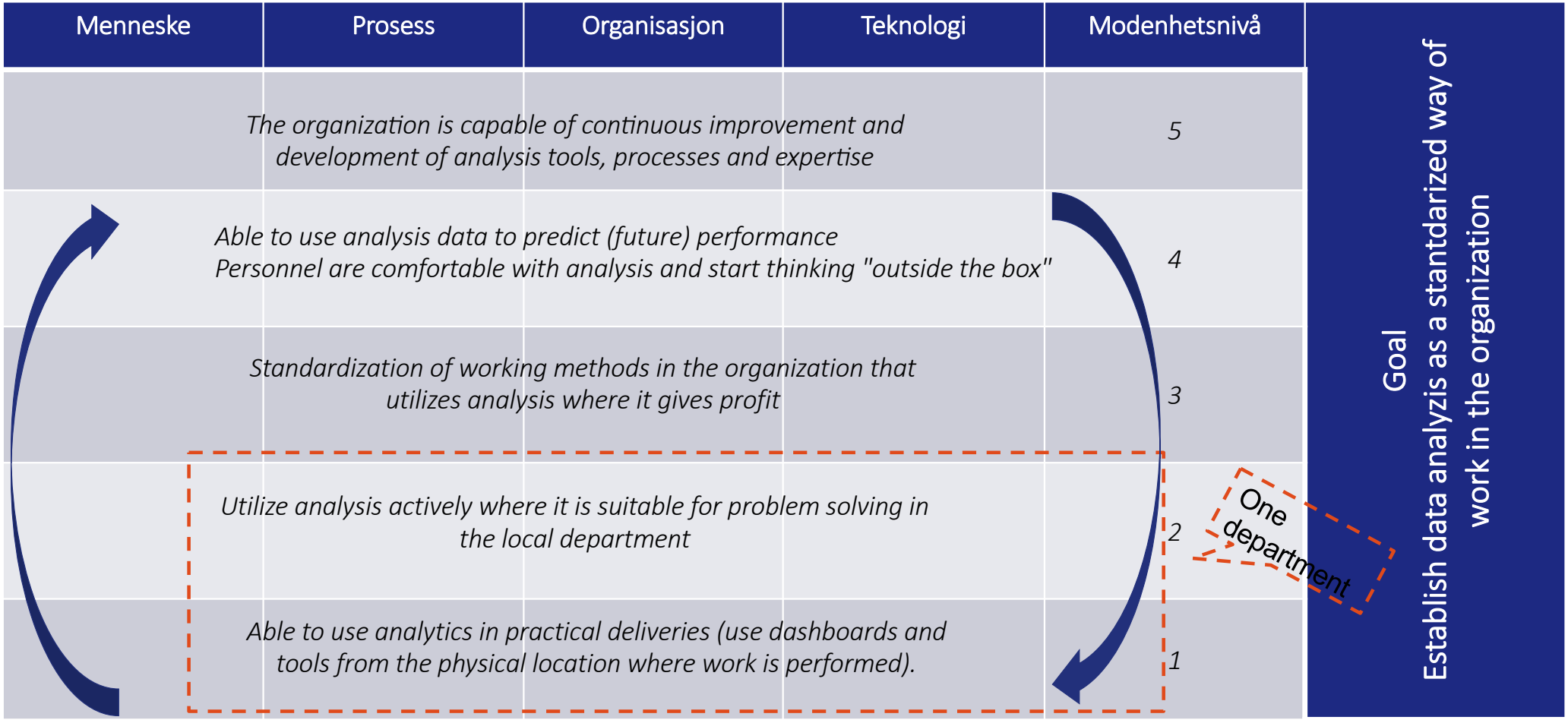
Translate to maturity matrix



Develop plan

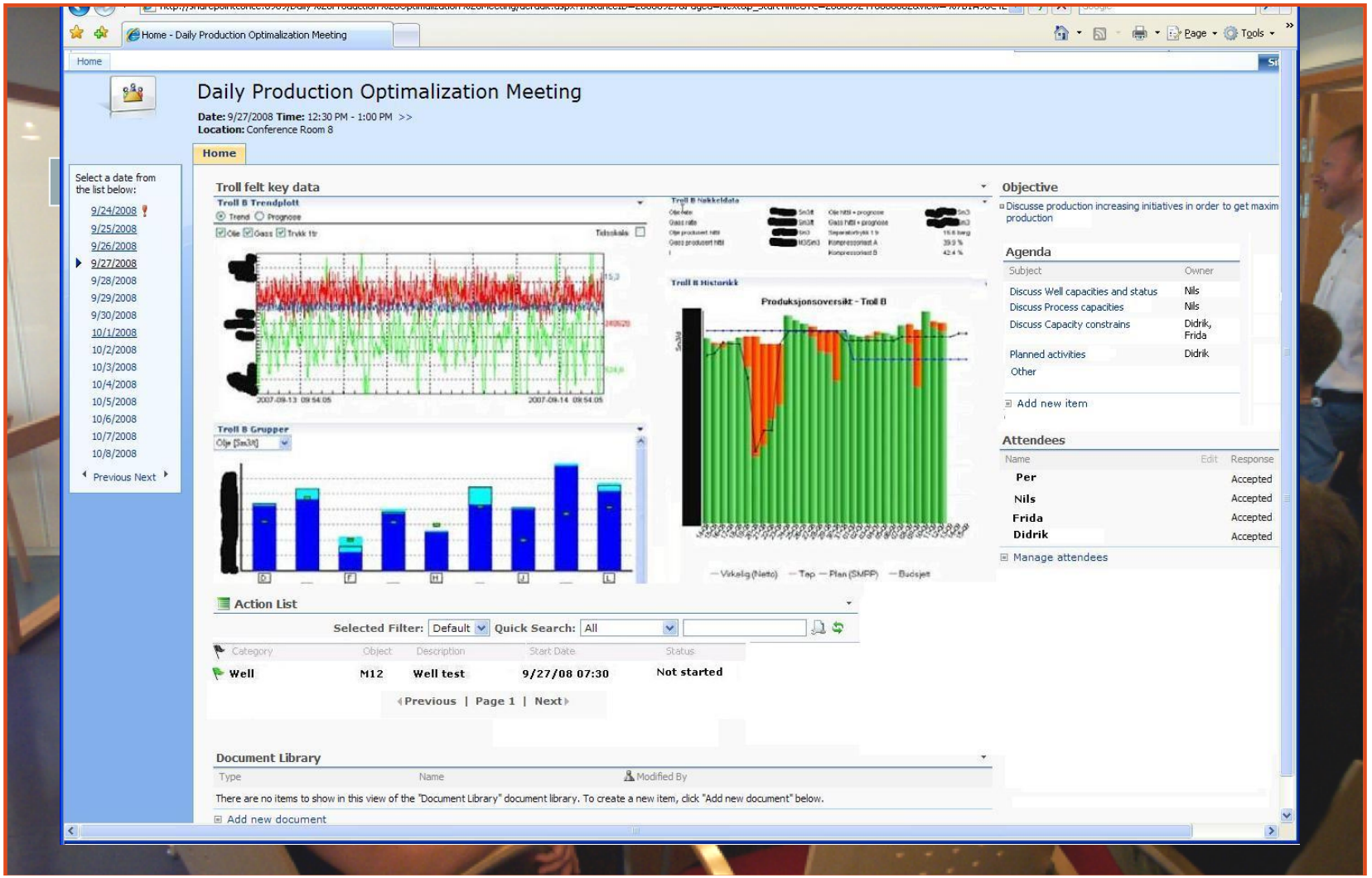

Operational capabilities
Deliver production
Keep process facilities and wells in operation
Problem solving
Supporting capabilities – solutions across silos in the organisation
Analytics
Collaboration
Innovation
Influence
Foundational capabilities
Operational wells and subsea facilities
Operational control facilities, networks and IT solutions
Functioning value chain and organisation

Requirements for analytics capability



Based on P-CMM by Carnegie Mellon University (2009)

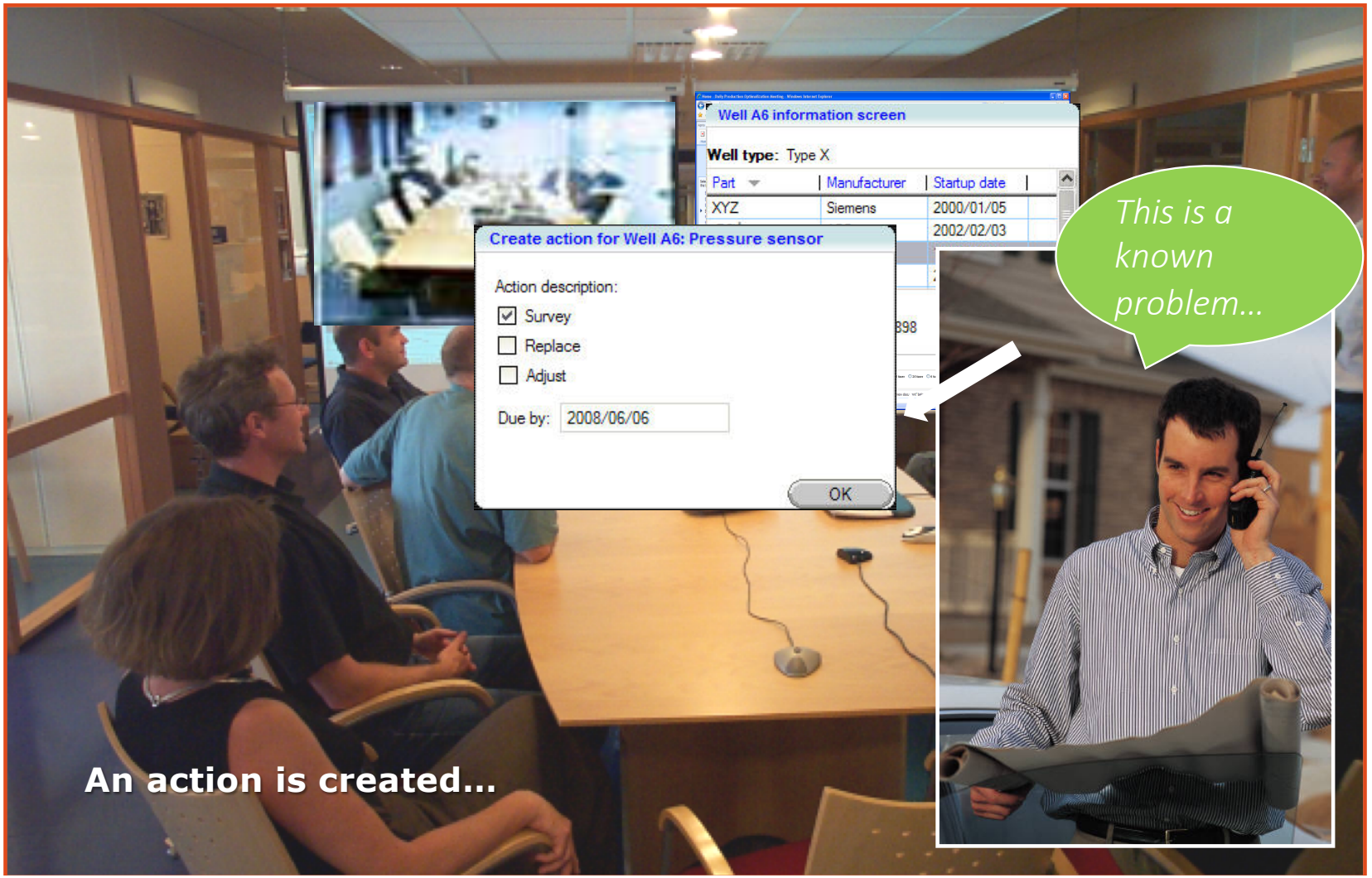
Starts the Daily production optimization meeting



An anomaly is discovered

Problem detection and resolution

An expert must be contacted



Potential challenges to improving collaboration

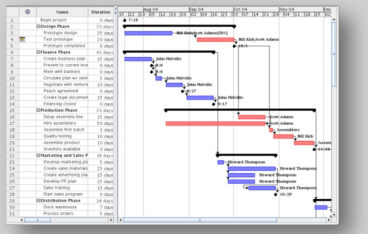
Technology

- 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?

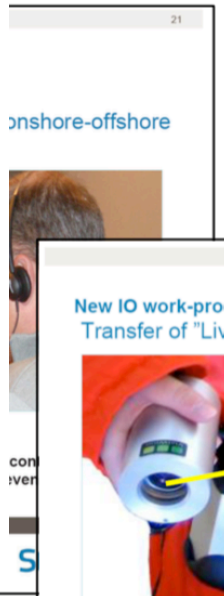
Clear meeting owner

Shared understanding of meeting purpose and scope

Fixed agenda

Shared work surface

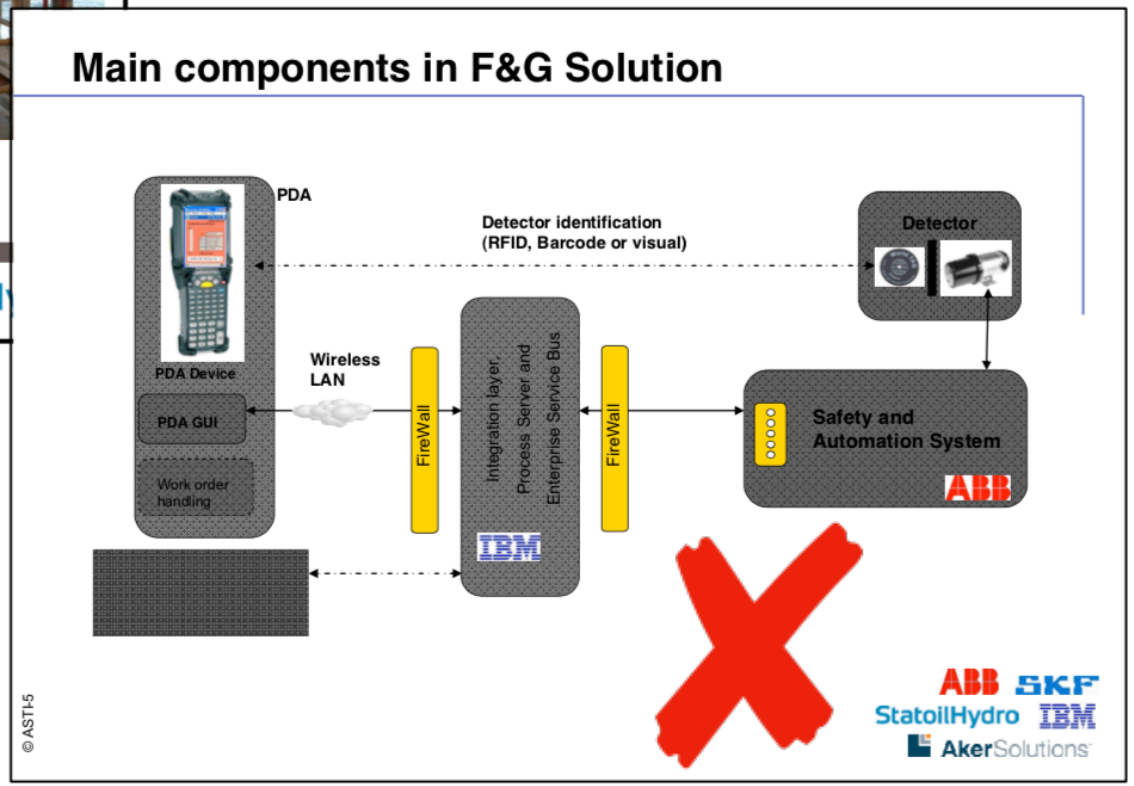
Evaluate meeting regularl



Transfer of "Live" video to technical expertise onshore

Wireless sensors and CCTV surveillance of equipment

Fire and Gas testing from handheld equipment



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

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

Thank you for your attention

Questions?

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Institute for Energy Technology
Norway