How to integrate HF (early) in a development project

Experience from Remote Cranes for Yggdrasil & PWP-Fenris

Håkon Augensen, Human Factors specialist, Aker BP

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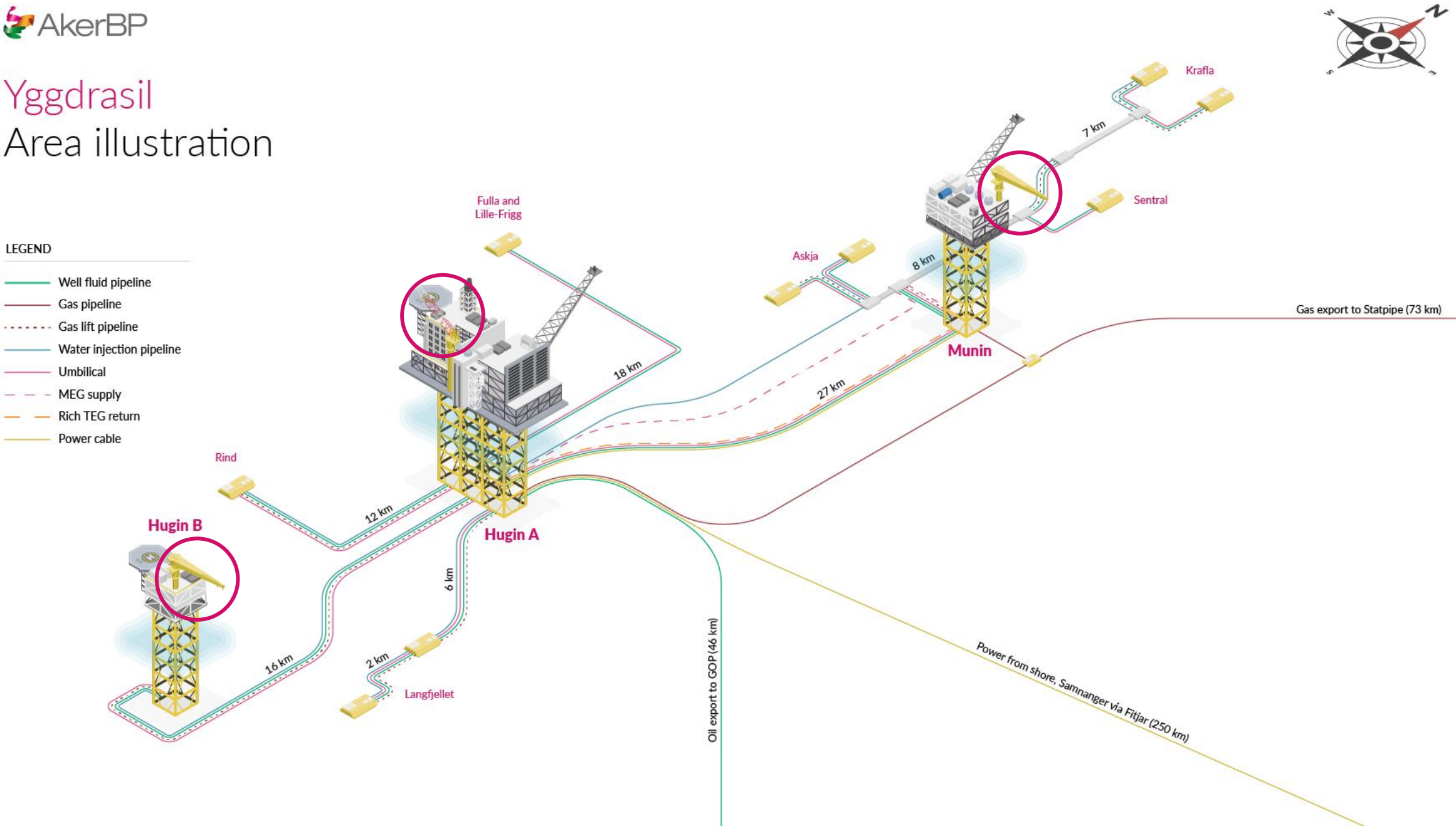
Yggdrasil
Area illustration



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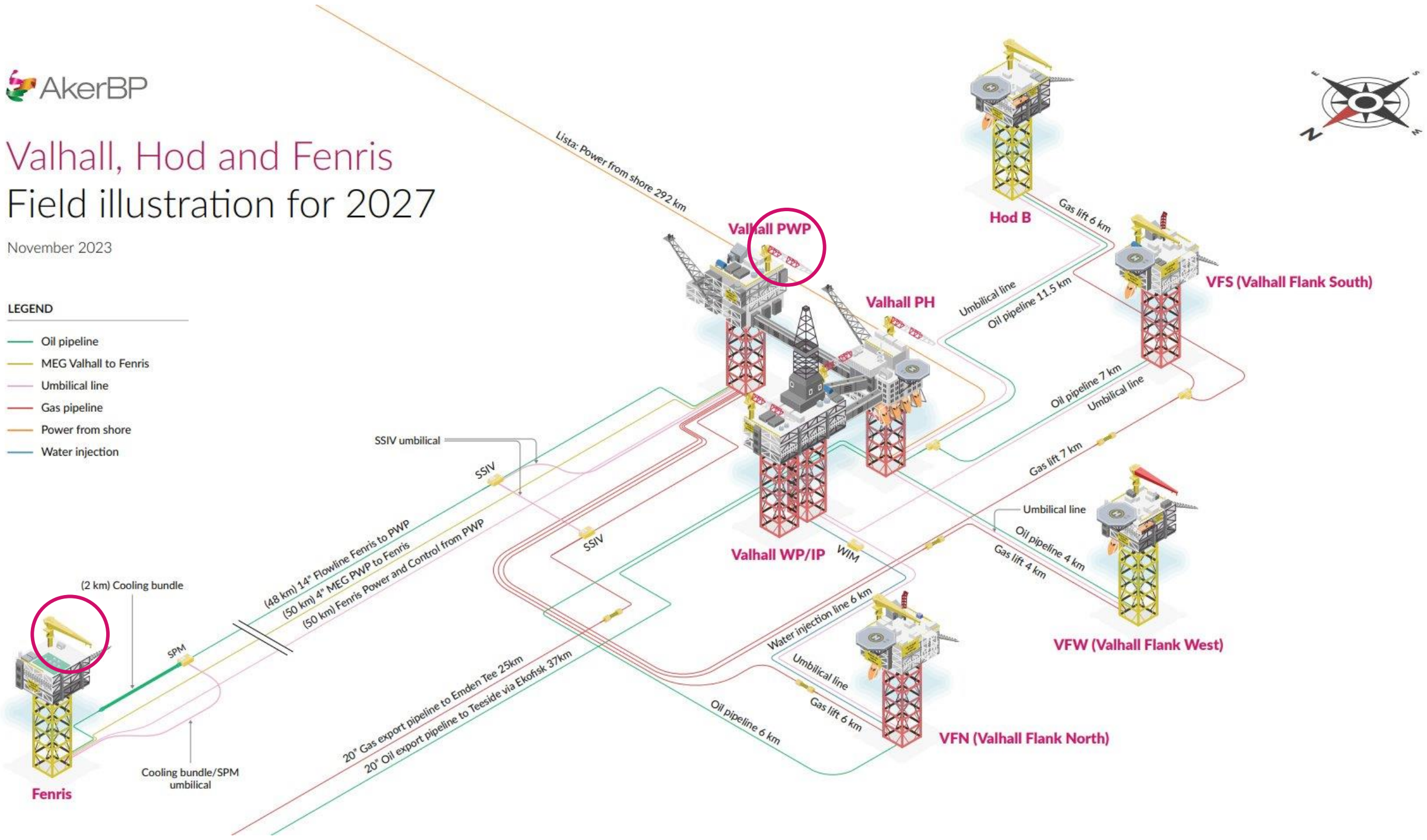
Valhall, Hod and Fenris

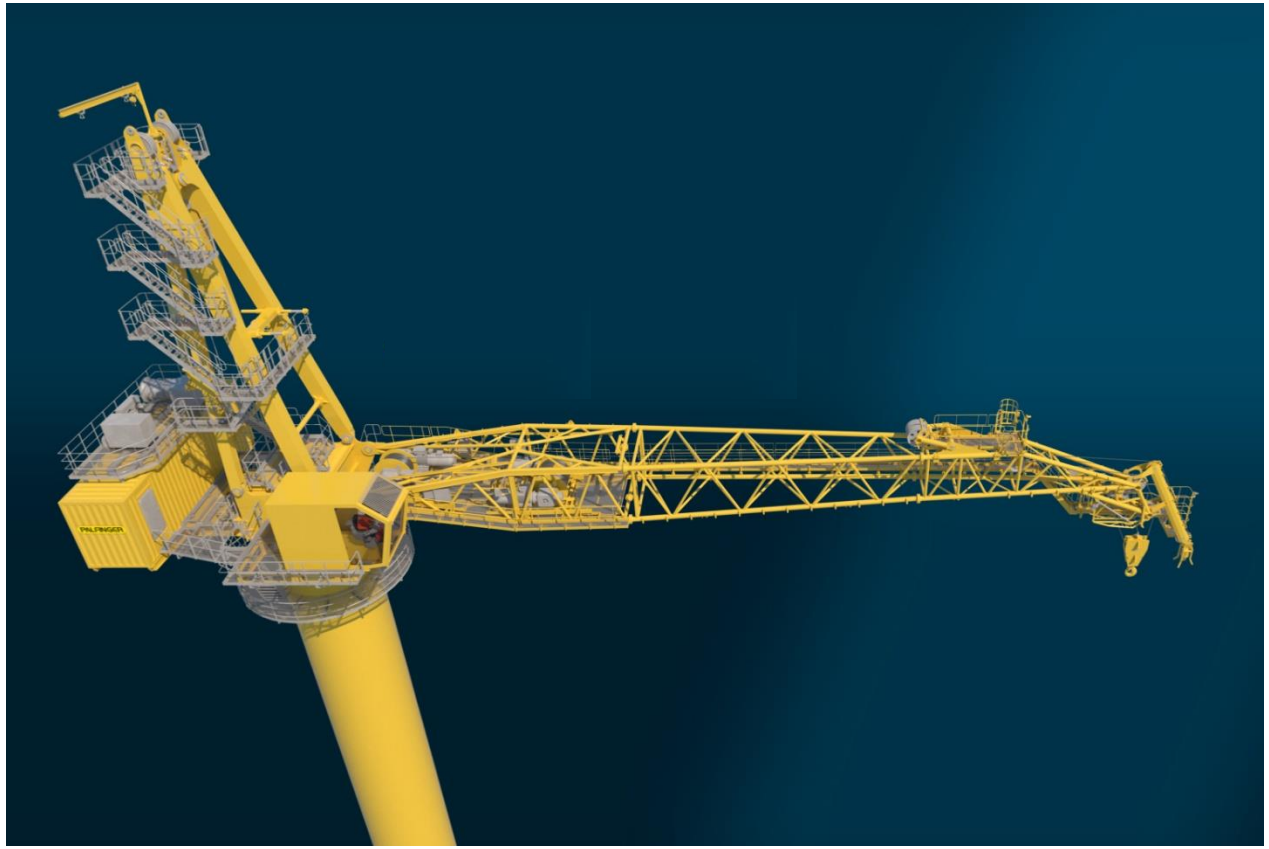
Field illustration for 2027

November 2023



Offshore cranes

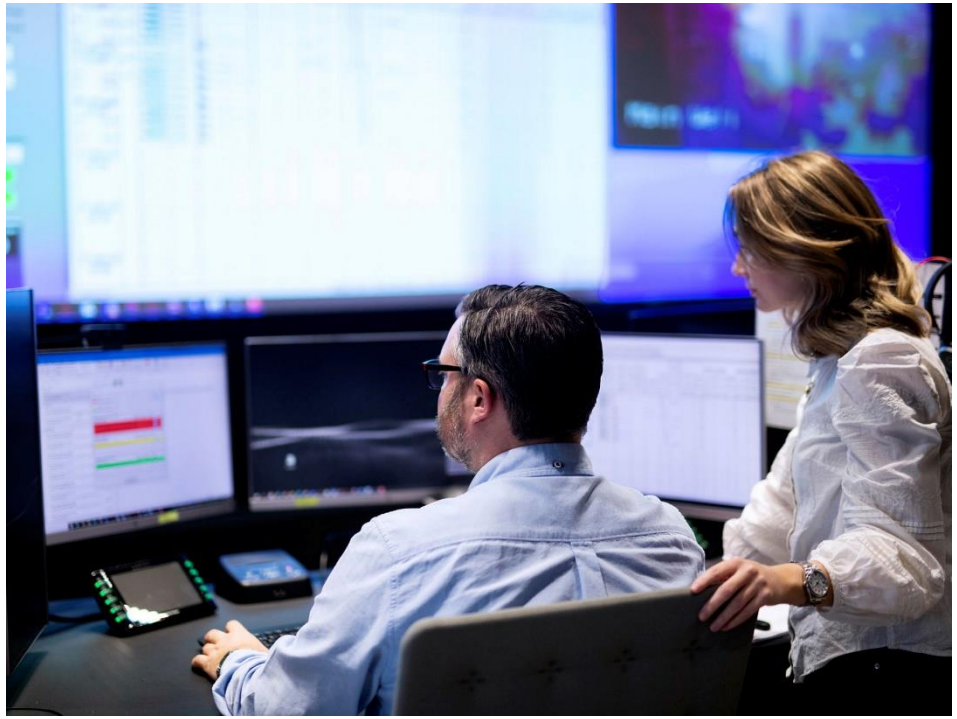
Electric



Background for remote control

Increased

- Safety
- Efficiency



HF related standards in the crane specification (incl. R&D)

Initial standards and standards including HF related requirements

- **ISO 13849-1 Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design**
- **EN ISO 12100:2010 Safety of machinery – General principles for design – Risk assessment and risk reduction**
- **ISO 8566-1:2010 Cranes - Cabins and control stations - Part 1: General**
- **EN 13557:2003+A2:2008 - Cranes Controls and control stations**
- **IEC 62443-3-2 Security for industrial automation and control systems – Part 3-2: Security risk assessment for system design**
- ISO 9241-210:2019 Ergonomics of Human-system interaction
- EN 614-1:2006+A1:2009 Safety of machinery Ergonomic design principles - Part 1: Terminology and general principles

Later also:

- ISO 11064, EN 842, EN 894, several in the ISO 9241 series, ISO 6385, EEMUA 191, IEC 62682…

HF related statements in specifications

- *HMI development according to relevant standards.*
- *The cabin shall be designed with focus on ergonomics and Human Machine Interface.*
- *Reduce the likelihood of human error.*
- *Risk: human operator putting too much trust in the technology.*

How it started…

I've seen a list of some HF standards we need to follow – I need help – let's find who works with HF

Hi, Håkon, I'm the new R&D lead for the remote cranes – we need some assistance

Ok, I'll say something about HF and explain the HF requirements

And continued…

These are the standards. This is the process.

We need to hire a HF specialist.

We need a mockup or lab.

The main contractor need to engage a UX designer.

Engaged consultants…

HF specialist

Lene Kristine Larsen

Principal Safety Advisor, Safetec

MSc Work and Org. Psychology

UX designer

Roanna Hutcheson

UX/ Service Designer, Knowit

MSc Product Design Eng.

From “firsthand experience” to “secondhand observation”

HF challenges

- Limited sensory input (vision only)
- Rely on what the system presents
- Adjusting view by adjusting/ selecting camera
- Vision: 2D perception
- Secondhand input: lag, processed, distorted
- Technical limitations
- Risk of “gamification”

Development areas

Several parallel development tracks, more or less interdependent:

- Offshore cranes
- Remote crane control room
- Remote crane control system, incl. new Assistance, Automatic and Safety functions
- Sensor technology
- Autohook
- Simulator
- + infrastructure, organization, BMS, competency/ manning/ training, etc

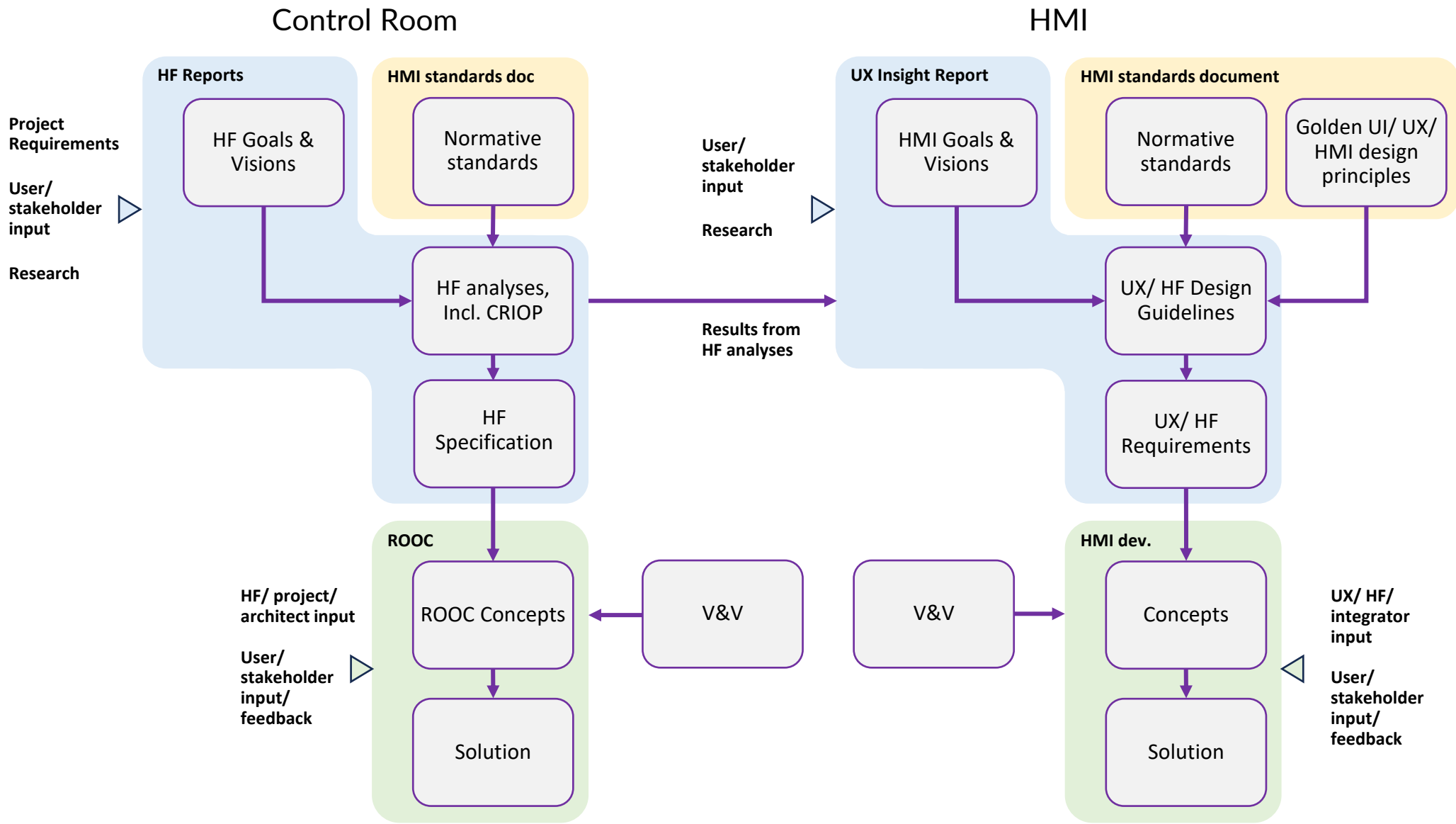
Quite a complex project

ROOC - Remotely Operated Offshore Cranes

Three rooms in the new office in Jåttåvågen (Gnist)

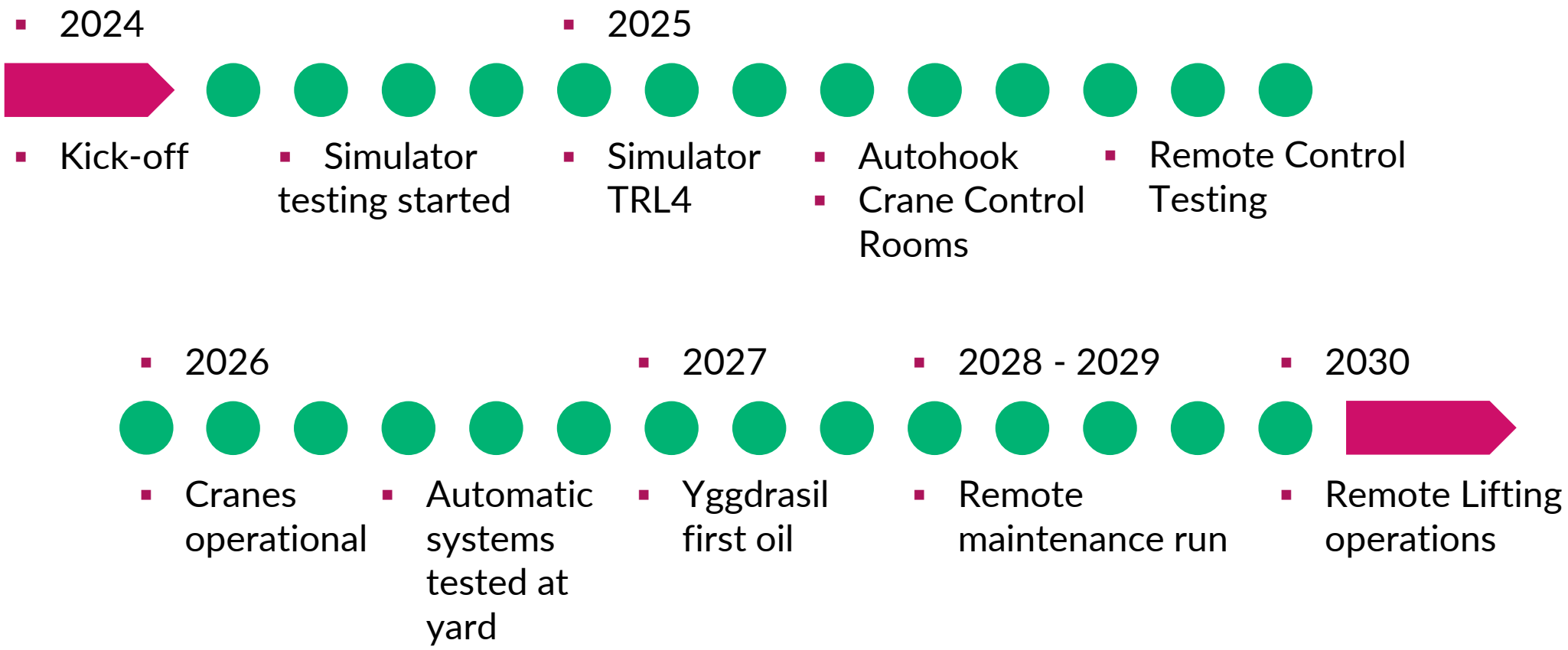
Process

Several



Mock-up, first hand trial & error, look & feel

Important milestones – Remotely Operated Cranes



Integration of HF

Keywords for why we (so far) have succeeded

- Curiosity, understanding and knowledge
- Early end user and stakeholder involvement
- Communication, openness
- Competency, experience
- “One team”, working together
- Proper, adapted processes and methods
- Project management
- Positive, engaged and involved contractors and subcontractors
- “Proof of concept” (w.r.t. HF)

Comments about Human Factors in the project…

Answers to a quick, anonymous questionnaire

Human Factors is…

- *Ensuring the interaction between humans and their surroundings is safe, user friendly and efficient.*
- *To understand people`s abilities in order to make systems, tools, and environments better.*

Why focus on HF in the project…

- *In such a safety critical project it is essential that users have an optimised set-up to ensure they do their job safely and efficiently.*

Insight…

- *I've learned how extensive HF is in general. I knew that good practices in design existed, but didn't understand how broad and deep these concepts are.*
- *I have discovered the criticality of using human factors in such an industry and see the need for more of it to be applied in similar industries.*

In short…

Right people doing the right things at the right time…

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