Practical experiences and best practice in human factors across various sectors, enhancing safety, efficiency and performance

HFC Spring meeting 8. – 9. April at Havtil (Norwegian Ocean Industry Authority) in Stavanger

Summary

The **Human Factors in Control (HFC) Spring Meeting** was held in Stavanger on April 8–9, 2025. This two-day event, hosted by the Norwegian Ocean Industry Authority (Havtil), brought together professionals from industry, academia, and government to share experiences in integrating human factors early in projects. The meeting highlighted positive outcomes and best practices from diverse sectors, underlining how early human-factors focus can improve safety, efficiency, and performance. Attendees included presenters from authorities, operators, service providers, system developers, consultants, researchers and many more, ensuring a wide range of perspectives and expertise.

Throughout the meeting, ample time was reserved for open discussion and networking. Each session was followed by interactive Q&As, and extended coffee breaks gave participants a chance to connect and share perspectives across disciplines. This strong emphasis on networking, collaboration and knowledge sharing is central to the HFC meetings. In particular, it reinforced HFC's mission to promote early incorporation of human factors in planning and design – a theme that resonated in discussions across both days.

Day 1 – April 8, 2025

The Human Factors in Control (HFC) started with an opening address from Roar Høydal (Fagleder Arbeidsmiljø) of HAVTIL, highlighting Havtils focus on human factors and an interdisciplinary approach to following up relevant stakeholders. The first session explored the use of eye-tracking technology in well control operations, presented by David Lobdell from IOGP, highlighting its potential for improving situational awareness and safety. Stein Helgar from Halogen then discussed the design of future wind turbine control rooms where operations are not the main focus, emphasizing energy production management in relation to consumption. Vidar Hepsø of Equinor shared insights from the operation of Hywind Tampen, providing a human factors perspective on offshore wind and shared control

rooms between offshore wind energy and oil and gas facilities. The focus then shifted to aviation, where Linda Lunde-Hanssen from IFE presented a user-centred design process for remote air traffic control towers, followed by Jens Petter Duestad of Avinor, who shared practical experiences from operating the developed centre. Later sessions addressed the human role in future ocean space operations with Ole Andreas Alsos from NTNU and concluded with a discussion on challenges and solutions in rail transport by Per Christofferson of BANENOR.

Day 2 – April 9, 2025

The second day started with a brief recap of the first day and the group discussions. Fredrik Strøm Dørum from HAVTIL presented on the supervision of alarm management systems in drilling cabins, addressing regulatory and operational perspectives. This was followed by a session from Marius Fernander of DNV and Svein Harald Gabrielsen of Equinor, who discussed good practices and lessons learned in the design and use of drilling cabins. Håkon Augensen of AkerBP presented experiences from the Yggdrasil project, emphasizing the importance of integrating human factors early in development—specifically in remote crane operations. Rodica Mihai from NORCE closed the technical sessions with a presentation on enabling human oversight in autonomous operations, based on insights from the development of autonomous drilling technology. The conference concluded with a plenary discussion and closing remarks from HAVTIL and SINTEF. Participants were then invited to a guided tour of the Ullrigg test drilling facility by NORCE.

Summary of group and plenary discussions

Group 1

- How to make a compelling case for HFE at an early project stage?

Viktig med god dialog med ledelsen. Bygge på anerkjente standarder – ISO 9241-210 ble nevnt – var gjennomgående brukt av alle prosjektene.

- How can we transfer the results from successful HF projects to other areas and industries?

Det gode sikkerhetsmiljøet fra luftfart og det at man prioriterte «Just Culture» var oppfattet som positivt. Kunne lære mye fra luftfart.
Det var deltakere som kom fra luftfart og som mente de hadde mye å bidra med inn mot olje&gass næringen.

- What are the main learnings to improve our existing HF processes and standard designs?

Var noen som hadde sansen for «Meningful Human Control» som et utgangspunkt.

Day 1 specific presentations:

- How can eyetracking and similar studies be better integrated in the design of control rooms?

Deltakerne likte dette foredraget, og det ble spesielt lagt vekt på at mennesker bare kan følge opp en oppgav (one task).

- What are the main learnings from this case – What can be transferred to improve existing HFE process and design of control rooms?

Her var det mange kritiske diskusjoner på hvordan man kunne akseptere at en person styrte tre eller flere flyplasser, dette med at
Mennesker bare kan styre en task ble trukket frem – så hva gjør du når du lander tre fly samtidig – det går vel ikke – vil alltid kunne skje at det kan hende.
(Konklusjonen var vel at vi møtte be om hjelp fra supervisor) og det ble også ønsket referanser til teori på dette punktet.

Dag 2:

- Do we need a new approach to identify and handle alarms?

Svaret er jo ja – og spørsmålet ble også – hvordan kan dette ha utviklet seg?

- Does the “current” best practice address the needs?

Var håp om at den nye versjonen av CRIOP kunne håndtere dette.

Group 2

How to make a compelling case for HFE at an early project stage?
How can we transfer the results from successful HF projects to other areas and industries?

What are the main learnings to improve our existing HF processes and standard designs?

- Ulike regimer og ulikt nivå på HFE i ulike næringer/kontekster – veldig ulike rammebetingelser i ulike næringer og ulike forståelse av HF
- Må ha støtte fra ledelse/prosjektledelse for suksess
- Må ha samarbeid med alle «stakeholders»
- Må ha folk som kan HF
- Må ha systemperspektiv, holistisk – MTO
- Ikke bare tenk HF, men helhet
- Ikke tenk i siloer, men helhet.
- Ikke bare se på teknologi, men også organisering
- Organisatoriske faktorer, kapaistet, arbeidsmengde osv. i ulike situajsoner er viktikg
- Kjedsomhet like farlig som stress
- Kan ikke bare løpe etter teknologien – leverandører kan alltid tilby deg noe
- Viktig å dele opp prosessen i sekvenser
- Definere oppgaver (oppgaveanalyse), behov, krav, før man setter i gang.
- Fort gjort å fokusere mye på teknologi: Ikke glem organisering, roller og organisering av arbeidet (sekvenser, oppgaver, roller ansvar osv.)
- Ved fjernstyrte prosesser nødvendig med «human in the loop» - også på AI
- Først se på hva hvem skal gjøre hva – deretter se på teknologi - må ha klar kravspek.
- Må være forberedt på å teste «as you go» - iterativt
- Ressurser er en utfordring – HF, krever tid, kompetanse, planlegging, penger osv. Må være «business case» – f.eks. redusere sykefravær
- Tør å løse opp i roller og kompetanser
- HF må lage klare, tydelige rapporter
- Multi CR: HVordan sikre kontroll på flere installasjoner samtidig? Multi-tasking, oppgaveanalyse, SA, sikkerhetskritiske situasjoner osv.
- Viktikg at ledere ,designere, leverandører osv. forstår grunnleggende prinsipper for HF

Kompetanse hos operatører i remote control rooms

- Bør ha erfaring fra «real operations» - skip, flyplass osv.
- Lager simulatorer som er basert på at de har jobbet operativt (f.eks. flyplass eller skip)
- De som er født i 2020 er gode på «gaming» og håndtere teknologien — mangler kanskje risikoforståelse. De trenger andre systemer og annen opplæring.
- Må være forberedt på at det kan dukke opp spesielle situasjoner Remote som ikke skjer «normalt».

- Må planlegge og designe for normal drift og sikkerhetskritiske situasjoner hvor det kan skje mange ting samtidig

Eye-tracking (ET) mm.

- Må være klar over hva ET kan brukes til og ikke
- Husk at det finnes mye forskning på ET – trenger ikke sette i gang med ET på mye når det finnes kunnskap – må bruke forskningen
- Ofte vanskelig å løse ting i engineering fasen – mange ulike aktører. Eye-tracking kan bidra til finjusteringen

Erfaringer fra «Remote towers»

- Må lage klare kravspek til leverenadørene - hva er forventninger/krav til HMI?
- Mange kamper underveis - «de» sa det var umulig, men det er mulig
- Gode krav til leverandørene er viktig
- Bygger ikke alt på en gang, men bygger lag på lag med løsninger
- Bruk standarder: ISO 11064 og NUREG
- Læring: Få med HF-kompetanse tidlig nok
- Skulle tenkt mer på SA der det er situasjoner på flere plasser samtidig
- Må beregne arbeidsbelastning - Nødsituasjon(er) er mest arbeidskrevende
- Krevende hvis det er hendelser på flere flyplasser samtidig

Group 3

- Gruppen brukte tida for å bli bedre kjent med hverandre og en del synspunkter ble diskutert rund de forksjellige presentasjonene. En viktig læring ble trukket frem:
    - Kvalitet på analyser kan noen ganger være bedre. Det er også ofte laaaange rapporter – og oppdragsgiver vet ikke hva som er avvik og hva som ikke er avvik. Dette må komme tydelig frem i en HF analyse og i rapporten. HF må jobbe hos og med kunde. Blir ofte lett for akademisk i rapportene.

Group 4

How can eye tracking and similar studies be better integrated in the design of control rooms?

- Included as a natural part of established HF methods such as SA and FATA.
- Human Factors experts need flexibility, authority and support to decide the methods used in the project

- Rules, regulations, company requirements and best practice should be open for new methods and customizing the methods based on needs.
- Possible limitations:
    - Unnatural effects of the attention and study in it self (Hawthorne effect)
    - Not including Performance shaping factors in the study (stress, time of day, fatigue)

What are the main learnings from the last session? What can be transferred to improve to existing HFE process and design of control rooms?

- Introduce and involve HF (and HF competency) early in projects. Ensure Human Factors integration.
- Take part in defining Operational Models, project goals and technology assessment.
- Define valid, measurable goals w.r.t. HF and User Centred Design.
- Focus on Situational Awareness - and define what that means (for the project).
- Use (new) technology to improve safety, efficiency, effectiveness, well-being – do not use new technology "just for the sake of it".

Do we need new/better approaches to identify and handle alarms?

- Mostly issues discussed: suppliers that have standardized systems, economy short and long term, management of change, missing integration systems
- Solution: Standardization and regulations

Group 5

Day 1

The group discussed the use of eye tracking and physiological indicators (such as dwell time and heart rate variability) in tools for tracking and mitigation of fatigue. A key point was that people often don't realize how fatigued they are, especially over longer time periods, and do not know the effects of fatigue or how to mitigate them.

Self-monitoring tools may help increase awareness, but the following question was raised: even if operators recognize a decline in performance, what can they do? How is the information relevant and useful for the organization? This also led to discussion about "state alarms" alerts triggered by the operator's condition or performance level, rather than just system parameters.

There was also discussion on the need for standardisation of HMI elements, for better usability across platforms and as a way to align workflows and user mental models. The OpenBridge design system was also mentioned, particularly in relation to consistency in interface components and layout.

We also briefly talked about differences in human factors approaches between Canada and Norway. Some speculated that Canada might focus more on regulations and procedures, while Norway tends to take a more integrated, participatory approach that takes the operational context into account.

Regarding Session 2, there was a discussion about overestimating the value of new technologies, such as eye tracking, without clear strategies for their use, rather than the assumption that more data automatically is useful. One important question is how this information can be translated into meaningful actions for individuals or organizations.

Day 2

The main discussion topic was the meaning and implications of human oversight in systems involving AI and autonomy, and how the concept varies depending on the perspective:

- Legal: with concerns around accountability and liability
- Technical: with concerns about requirements for fail-safes and operator intervention
- Human factors: with concerns about the design of interfaces, cognitive workload, and authority in decision-making

Another topic that came up was how lessons from the oil and gas sector, such as remote operations and control centre design, can be transferred to other domains such as the maritime sector.

There was mention that the IMO's MASS Code (Maritime Autonomous Surface Ships) is currently being integrated into Swedish legislation. However, there is still work needed before it is fully ready for implementation.

The group also talked about common challenges in human-machine interaction (HMI) across maritime, oil and gas, aerospace, and traffic sectors. These include issues related to interface complexity, information management, and workload, but also are related to methods and how to stay updated om developments in technology. There was general agreement that we all must work to make sure human factors input is practical and actionable and not too abstract/academic, to be useful and usable for engineers and decision-makers. That means:

- Giving clear, practical recommendations
- Linking to relevant standards and regulations to back things up

The MIDAS Academy was mentioned as a interesting and relevant initiative for training and building capacity in human factors, and their experience in participatory design for remote operation centres (fjernoperasjonssentre), particularly in the context of autonomous and remotely operated systems.

Group 6

Om alarmhåndtering

- Svært tidkrevende arbeid å utbedre/følge opp alarmsystemer når arbeidet har vært utsatt lenge. Det ble nevnt at i de tilfellene operatørene valgte å gjøre dette selv, er

det en risiko for at arbeidet blir utsatt og må konkurrere med andre oppgaver. Dette kan gi storulykkepotensial.
- Det ble diskutert at arbeidet dermed kunne ta for lang tid.
- Økt kompetanse om systemene er viktig

Eyetracking:

- Ble diskutert at dette kunne benyttes ved simulatortrening, men at det krever at en har en kultur som fremmer åpenhet.
- Vegvesenet nevnte at de bruker det
- En bør fremme læring fra Avinor på dette feltet

Remote flytårn

- Det er en kjempefordel å starte tidlig og i riktig ende
- Å unngå å kopiere det gamle, men tenke nytt er viktig
- Få med ekspertkompetanse i tidlig fase
- En må tåle at det blir mye motstand og at prosjektene tar tid, mye lenger enn en gjerne forventet
- Det er en fordel å ha erfaring fra det virkelige systemet - nå man har aldri vært offshore, f.eks., er det vanskelig å forestille seg betydningen for de som jobber det, når noe går galt, mens man sitter på et kontor på land
    - Det kunne går inn i utdanningen/opplæring/trening for å bedre forståelse hva man driver med

Plenary discussion

- Safety and risk sciences have a different level of implementation in the different industries, for example, oil and gas and the maritime industry
    - In order to promote HF related to risk and safety appealing cases need to be highlighted, showing the benefits for the industries that lag behind HF
- Human Factors reports are often too imprecise with respect to a) deviations and recommendations, and b) Measures to be taken to address the deviations
    - These need to be better tailored to the recipients
- Luck was mentioned several times, when it comes to involving HF early in design and system development
    - Luck here are the right people, who are aware of the benefits of HF and involving the right people early
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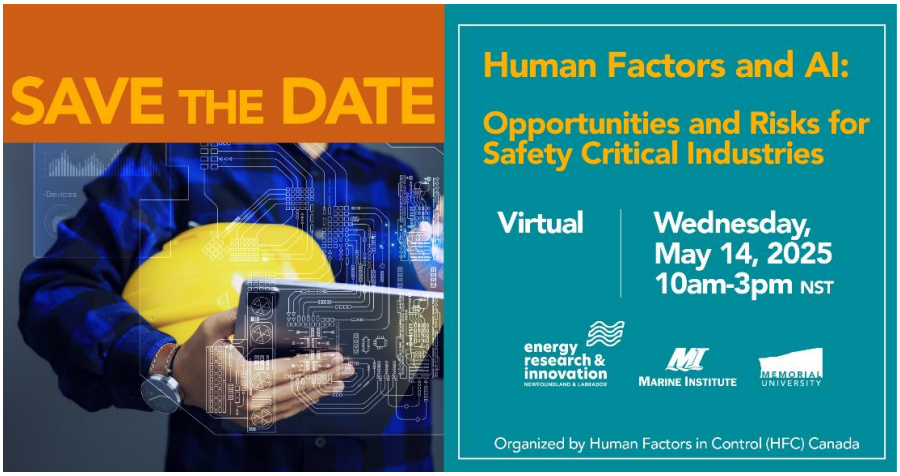
- Steven Mallem from the HFC Canada invited to the virtual event Human Factors and AI – Opportunities and Risks for Safety Critical Industires



Notes on presentations and additional references

The following presentations were held. Bullet points provide additional information related the talk.

Velkommen fra Havtil - Roar Høydal, Havtil

Assessment of eye tracking technology in well control operations - David Lobdell, IOGP

- Links to the IOGP reports on the eye-tracking studies:
  - https://www.iogp.org/bookstore/product/assessment-of-eye-tracking-technology-in-well-control-operations/
  - Onshore testing: https://www.iogp.org/bookstore/product/assessment-of-eye-tracking-technology-in-well-control-operations-onshore/
- The final report is going to be published soon with the results from the offshore experiments

Fremtidens kontrollrom for vindturbiner – Når drift ikke er hovedfokus Styring av kraft produksjon i forhold til forbruk – Stein Helgar, Halogen

Erfaringer fra drift av Hywind Tampen sett fra et HF-perspektiv – Vidar Hepsø, Equinor

- http://dx.doi.org/10.3850/978-981-18-5183-4_R12-04-060-cd

Utvikling av senter for fjernstyrte tårn for lufttrafikktjenester: En brukersentrert designprosess – Linda Lunde-Hanssen, IFE

Erfaringer fra senter for fjernstyrte tårn for lufttrafikktjenester – Jens Petter Duestad, Avinor

Menneskets rolle i fremtidens havromsoperasjoner – Ole Andreas Alsos, NTNU

- Newly launched the www.midas-academy.no

Utfordringer og løsninger for Human Factors innen jernbane – Per Christofferson, Banenor

Tilsyn med alarmhåndteringssystemer i borekabin – Fredrik Strøm Dørum, Havtil

- The HAVTIL report from 2022 *Ansvar, kompetanse og vedlikehold av alarmhåndteringssystemer i kontrollrom* is also uploaded on the HFC webpage. This report does not summarize the findings from the 2024 compaign but give some insights on matters that HAVTIL has prioritized in their campaign.

God praksis rundt borekabiner – rapport og erfaringer – Marius Fernander, DNV; Svein Harald Gabrielsen, Equinor

Hvordan få HF tidlig inn i et utviklingsprosjekt - erfaring fra Remote Cranes i Yggdrasil-prosjektet – Håkon Augensen, AkerBP

Muliggjøre menneskelig tilsyn i autonome operasjoner – lærdom fra utvikling og demonstrasjon av autonom boring – Rodica Mihai, NORCE

- https://www.norceresearch.no/en/research-group/energy-modelling-and-automation