

HFC møte 26. og 27. april 2022 "Menneskets rolle i nye teknologier og driftskonsepter – Will Industry 5.0 herald the revenge of the humans?"

Hei – Takk for god og engasjert deltakelse i Ålesund/HFC møtet med tema: "*Menneskets rolle i nye teknologier og driftskonsepter – Will Industry 5.0 herald the revenge of the humans?*".

Vi vil også benytte anledningen til å informere om at det neste fysiske møtene blir **17. og 18. oktober i Trondheim**, og vi håper vi ser mange av dere der. Vi vil basere møtet på innspill vi fikk fra dere i møtet i Ålesund.

I Ålesund var vi 85 påmeldte. Vi fikk for mange deltaker i forhold til kapasiteten, så vi måtte dessverre begrense antall deltakere ut fra påmeldingstidspunktet. Vi hadde deltakere fra industri, myndigheter, forskningsinstitutter, konsulentbransjen og Universiteter: AkerBP, Autronica Fire and Security AS, Avinor AS, Avinor Flysikring AS, DNV, Equinor, Gard, Halogen, HFN (Human Factors Network Sweden), Human Centred Design, IFE, Institute of Resilient Systems +, Kongsberg Maritime, Kystverket, Marstal Navigasjonsskole, Massterly AS, Multi-Maritime AS, National Oilwell Varco Norway AS, Nord universitet, NTNU, NTNU Ålesund, Petroleumstilsynet, Safetec, SIMAC - Svendborg International Maritime Academy, SINTEF, SINTEF Manufacturing, SINTEF Ocean, Sjøfartsdirektoratet, Statens vegvesen, Torghatten AS, Transportstyrelsen (Sverige), University of Southampton, Vard Electro AS, Viking, Vysus Group, Zeabuz.

Kopi av presentasjoner og relevante papers/rapporter finnes på hjemmesiden til HFC (<https://www.sintef.no/projectweb/hfc/moetereferat/>), og nederst følger en oppsummering av noen av referansene som ble nevnt i de ulike presentasjonene.

1. Will Industry 5.0 herald the revenge of the humans? B. Henriksen/SINTEF

- The Global Risks Report 2023 18th Edition- www.weforum.org/reports/global-risks-report-2023/
- B. Henriksen & al. (2022). Industry 5.0–Making It Happen in the Agri Industry. The Core Product Service Platform. In Advances in Production Management Systems.: IFIP WG 5.7 International Conference, APMS 2022, Gyeongju, South Korea, September 25–29, 2022, Proceedings, Part I (pp. 424-431).
- S. Dixson-Decleve et al. (2022). Industry 5.0: A Transformative Vision for Europe Retrieved at: <https://op.europa.eu/en/publication-detail/-/publication/38a2fa08-728e-11ec-9136-01aa75ed71a1/language-en>

2. Distributed situational awareness (DSA) in sociotechnical systems N. Stanton

- Neville A. Stanton & Catherine Harvey (2017) Beyond human error taxonomies in assessment of risk in sociotechnical systems: a new paradigm with the EAST 'broken-links' approach, Ergonomics, 60:2, 221-233, DOI: 10.1080/00140139.2016.1232841
- Neville A. Stanton, Katherine L. Plant, Kirsten M. A. Revell, Thomas G. C. Griffin, Scott Moffat & Maggie Stanton (2019) Distributed cognition in aviation operations: a gate-to-gate study with implications for distributed crewing, Ergonomics, 62:2, 138-155, DOI:10.1080/00140139.2018.1520917

- Banks, V. A., Stanton, N. A., Burnett, G., & Hermawati, S. (2018). Distributed Cognition on the road: Using EAST to explore future road transportation systems. *Applied ergonomics*, 68, 258-266.
- Clark, J. R., Stanton, N. A., & Revell, K. M. (2019). Identified handover tools and techniques in high-risk domains: using distributed situation awareness theory to inform current practices. *Safety science*, 118, 915-924.
- Stanton, N. A., Salmon, P. M., Walker, G. H., & Stanton, M. (2019). Models and methods for collision analysis: A comparison study based on the Uber collision with a pedestrian. *Safety Science*, 120, 117-128.
- Neville A. Stanton (2014) Representing distributed cognition in complex systems: how a submarine returns to periscope depth, *Ergonomics*, 57:3, 403-418, DOI: 10.1080/00140139.2013.772244
- N. A. Stanton, P. M. Salmon, G. H. Walker, E. Salas & P. A. Hancock (2017) State-of-science: situation awareness in individuals, teams and systems, *Ergonomics*, 60:4, 449-466, DOI: 10.1080/00140139.2017.1278796

3.Når ISO ikke har alle svarene - hvordan ivareta mennesket gjennom brukersentrert design S. Helgar/Halogen

- Jan Fredrik Schönheyder, 2019. Method development for the design of safety-critical systems. The space between design research and professional design practice.; ref: https://aho.brage.unit.no/aho-xmlui/bitstream/handle/11250/2602820/JF_Sch%C3%B8nheyder.pdf?sequence=1&isAllowed=y
- <https://www.tu.no/artikler/ukraina-viser-video-av-nasams-som-skyter-ned-russiskkryssermissil/529185?key=gvy8YnXM>

4.AutoreMOTE operation of urban passenger ferries – combining autonomous operation with human oversight Ø. Smogeli/Zeabuz

- Smogeli, Ø. (2023). Autonomous Urban Passenger Ferries—A New Mobility Mode in Need of Appropriate Regulation. In *Autonomous Vessels in Maritime Affairs: Law and Governance Implications* (pp. 187-212). Cham: Springer International Publishing. <https://link.springer.com/book/10.1007/978-3-031-24740-8>

5.Utviklingen innen autonome (og ubemannede) skip og rollen til kontrollrommet med tanke på sikkerheten N. H. Bua/Sjøfartsdirektoratet

- International Maritime Organization. (2013). MSC. 1/Circ. 1455—Guidelines for the Approval of Alternatives and Equivalents as Provided for in Various IMO Instruments.

6.Human Factors in future operations of floating production vessels L. Critch/Equinor

- Cullen, L. (2007). Human factors integration—Bridging the gap between system designers and end-users: A case study. *Safety Science*, 45(5), 621-629.

8. Work as imagined, and work as done in the context of automation E. Hollnagel

- <https://www.skybrary.aero/bookshelf/systemic-potentials-management-building-basis-resilient-performance>
- Bainbridge, L. (1983). Ironies of automation *Automatica*, Vol. 19(6) pp. 775-779,
- Dekker, S. W., & Woods, D. D. (2002). MABA-MABA or abracadabra? Progress on human–automation co-ordination. *Cognition, Technology & Work*, 4, 240-244.
- Taylor, F. V., & Garvey, W. D. (1959). The limitations of a ‘Procrustean’ approach to the optimization of man-machine systems. *Ergonomics*, 2(2), 187-194.
- Wiener, N. (1988). *The human use of human beings: Cybernetics and society* (No. 320). Da Capo Press.
- Hollnagel, E., & Woods, D. D. (1999). Cognitive systems engineering: new wine in new bottles. *International Journal of Human-Computer Studies*, 51(2), 339-356.

9. Remote Tower – erfaringer fra fjernstyring av flyplassenes kontrolltårn i Norge J. P. Duestad/Avinor

- <https://kommunikasjon.ntb.no/pressemelding/avinors-digital-remote-tower-centre-is-one-step-closer-to-multiple-towers-operations?publisherId=17507039&releaseId=17951088>
- <https://avinor.no/en/avinor-air-navigations-services/services/remote-towers/>

10. Løsninger for fjernstyring av offshorefartøy med SeaQ Remote R. Tomren/VARD

- <https://www.skipsrevyen.no/seaq-remote-skipskontrollsystem-ward/ward-electro-lanserer-seaq-remote/1119240>
- <https://www.dnv.com/services/eu-marine-equipment-directive-med--2819>

11. Teaming with automation in future maritime systems K. Van der Merwe/DNV

- DNV (2018). DNVGL-CG-0264: Autonomous and remotely operated ships. <http://rules.dnvgl.com/docs/pdf/dnvgl/cg/2018-09/dnvgl-cg-0264.pdf>
- Endsley, M. R. (2017). From Here to Autonomy: Lessons Learned from Human-Automation Research. *Human Factors*, 59(1), 5–27. <https://doi.org/10.1177/0018720816681350>
- Endsley, M. R. (2023). Supporting Human-AI Teams: Transparency, explainability, and situation awareness. *Computers in Human Behavior*, 140, 107574. <https://doi.org/10.1016/j.chb.2022.107574>

- National Academies of Sciences, Engineering and Medicine. (2022). Human-AI Teaming: State of the Art and Research Needs. The National Academies Press. <https://doi.org/10.17226/26355>
- Mercado, J. E., Rupp, M. A., Chen, J. Y. C., Barnes, M. J., Barber, D., & Procci, K. (2016). Intelligent Agent Transparency in Human–Agent Teaming for Multi-UxV Management. *Human Factors*, 58(3), 401–415. <https://doi.org/10.1177/0018720815621206>
- MITRE. (2018). Human-Machine Teaming Systems Engineering Guide (No. MP180941; p. 68). MITRE Corporation. <https://www.mitre.org/publications/technical-papers/human-machine-teaming-systems-engineering-guide>
- Oswald, F. L., Endsley, M. R., Chen, J., Chiou, E. K., Draper, M. H., McNeese, N. J., & Roth, E. M. (2022). The National Academies Board on Human-Systems Integration (BOHSI) Panel: Human-AI Teaming: Research Frontiers. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 66(1), 130–134. <https://doi.org/10.1177/1071181322661007>
- Parasuraman, R., Sheridan, T. B., & Wickens, C. D. (2000). A model for types and levels of human interaction with automation. *IEEE Transactions on Systems, Man, and Cybernetics Part A: Systems and Humans*, 30(3), 286–297. <https://doi.org/10.1109/3468.844354>
- van de Merwe, K., Mallam, S., & Nazir, S. (2022). Agent Transparency, Situation Awareness, Mental Workload, and Operator Performance: A Systematic Literature Review. *Human Factors*, 00187208221077804. <https://doi.org/10.1177/00187208221077804>
- van de Merwe, K., Mallam, S. C., Engelhardt, Ø., & Nazir, S. (2022). Exploring navigator roles and tasks in transitioning towards supervisory control of autonomous collision avoidance systems. *Journal of Physics: Conference Series*, 2311(1), 012017. <https://doi.org/10.1088/1742-6596/2311/1/012017>

12. Operations of autonomous ships – ROC

R. Holm /Massterly

- <https://www.dnv.com/news/supporting-remote-control-operations-in-shipping-dnv-publishes-pioneering-new-competence-standard-and-recommended-practice-213200>
- <https://www.wilhelmsen.com/media-news-and-events/news/2020/massterly-to-operate-two-zero-emission-autonomous-vessels-for-asko/>

Med vennlig hilsen,

Frøy Birte Bjørneseth/ Kongsberg & NTNU, Andreas Bye/ IFE, Jan Tore Ludvigsen/ Equinor, Nalini Suparamaniam-Kallerdahl/ Vysus Group, Georg Giskegjerde/ DNV, Stig Ole Johnsen/ SINTEF & Dorthea Mathilde Kristin Vatn/SINTEF

(PS: Gi beskjed via HFC@Sintef.no om du vil bli fjernet fra denne distribusjonslista)

HFC meeting 26 and 27 April 2022 "*Humans' role in new technologies and operating concepts - Will Industry 5.0 herald the revenge of the humans?*".

Hi all – Thank you for your good and committed participation in the Ålesund/HFC meeting with the theme: "The role of humans in new technologies and operating concepts - Will Industry 5.0 herald the revenge of the humans?".

We would also like to take this opportunity to inform you that the next physical meetings will be on 17th and 18th October in Trondheim, and we hope to see many of you there. We will plan the meeting on the input we received from you in the meeting in Ålesund.

In Ålesund there were 85 registered participants. We received too many registrations in relation to the capacity, unfortunately we had to limit the number of participants based on the time of registration. We had participants from industry, authorities, research institutes, the consulting industry and universities: AkerBP, Autronica Fire and Security AS, Avinor AS, Avinor Air Navigation Services AS, DNV, Equinor, Gard, Halogen, HFN (Human Factors Network Sweden), Human Centered Design, IFE, Institute of Resilient Systems +, Kongsberg Maritime, Norwegian Coastal Administration, Marstal Navigationskole, Massterly AS, Multi-Maritime AS, National Oilwell Varco Norway AS, Nord University, NTNU, NTNU Ålesund, Petroleum Safety Authority, Safetec, SIMAC - Svendborg International Maritime Academy, SINTEF, SINTEF Manufacturing, SINTEF Ocean, Norwegian Maritime Directorate, Norwegian Road Administration, Torghatten AS, The Swedish Transport Agency (Sweden), University of Southampton, Vard Electro AS, Viking, Vysus Group, Zeabuz.

Copies of presentations and relevant papers/reports can be found on HFC's website (<https://www.sintef.no/projectweb/hfc/moetereferat/>), and below is a summary of some of the references that were mentioned in the various presentations.

1. Will Industry 5.0 herald the revenge of the humans? B. Henriksen/SINTEF

- The Global Risks Report 2023 18th Edition- www.weforum.org/reports/global-risks-report-2023/
- B. Henriksen & al. (2022). Industry 5.0–Making It Happen in the Agri Industry. The Core Product Service Platform. In Advances in Production Management Systems.: IFIP WG 5.7 International Conference, APMS 2022, Gyeongju, South Korea, September 25–29, 2022, Proceedings, Part I (pp. 424-431).
- S. Dixson-Decleve et al. (2022). Industry 5.0: A Transformative Vision for Europe Retrieved at: <https://op.europa.eu/en/publication-detail/-/publication/38a2fa08-728e-11ec-9136-01aa75ed71a1/language-en>

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3. When ISO doesn't have all the answers - how to take care of human perspective through user-centred design

S. Helgar/Halogen

- Jan Fredrik Schönheyder, 2019. Method development for the design of safety-critical systems. The space between design research and professional design practice.; ref: https://aho.brage.unit.no/aho-xmlui/bitstream/handle/11250/2602820/JF_Sch%C3%B8nheyder.pdf?sequence=1&isAllowed=y
- <https://www.tu.no/artikler/ukraina-viser-video-av-nasams-som-skyter-ned-russiskkryssermissil/529185?key=gvy8YnXM>

4. Autoremote operation of urban passenger ferries – combining autonomous operation with human oversight Ø. Smogeli/Zeabuz

- Smogeli, Ø. (2023). Autonomous Urban Passenger Ferries—A New Mobility Mode in Need of Appropriate Regulation. In *Autonomous Vessels in Maritime Affairs: Law and Governance Implications* (pp. 187-212). Cham: Springer International Publishing. <https://link.springer.com/book/10.1007/978-3-031-24740-8>

5. Developments in autonomous (and unmanned) ships and the role of the control room in terms of safety N. H. Bua/Sjøfartsdirektoratet

- International Maritime Organization. (2013). MSC. 1/Circ. 1455—Guidelines for the Approval of Alternatives and Equivalents as Provided for in Various IMO Instruments.

6.Human Factors in future operations of floating production vessels L. Critch/Equinor

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- <https://www.skybrary.aero/bookshelf/systemic-potentials-management-building-basis-resilient-performance>
- Bainbridge, L. (1983). Ironies of automation *Automatica*, Vol. 19(6) pp. 775-779,
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- Hollnagel, E., & Woods, D. D. (1999). Cognitive systems engineering: new wine in new bottles. *International Journal of Human-Computer Studies*, 51(2), 339-356.

9.Remote Tower – experiences from remote control of airports' control towers in Norway J. P. Duestad/Avinor

- <https://kommunikasjon.ntb.no/pressemelding/avinors-digital-remote-tower-centre-is-one-step-closer-to-multiple-towers-operations?publisherId=17507039&releaseId=17951088>
- <https://avinor.no/en/avinor-air-navigations-services/services/remote-towers/>

10. Solutions for remote control of offshore vessels with SeaQ Remote R. Tomren/VARD

- <https://www.skipsrevyen.no/seaq-remote-skipskontrollsystem-vard/vard-electro-lanserer-seaq-remote/1119240>
- <https://www.dnv.com/services/eu-marine-equipment-directive-med--2819>

11.Teaming with automation in future maritime systems K. Van der Merwe/DNV

- DNV (2018). DNVGL-CG-0264: Autonomous and remotely operated ships. <http://rules.dnvgl.com/docs/pdf/dnvgl/cg/2018-09/dnvgl-cg-0264.pdf>
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<https://doi.org/10.17226/26355>
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- <https://www.dnv.com/news/supporting-remote-control-operations-in-shipping-dnv-publishes-pioneering-new-competence-standard-and-recommended-practice-213200>
- <https://www.wilhelmsen.com/media-news-and-events/news/2020/massterly-to-operate-two-zero-emission-autonomous-vessels-for-asko/>

With all the best, from:

Frøy Birte Bjørneseth/ Kongsberg & NTNU, Andreas Bye/ IFE, Jan Tore Ludvigsen/ Equinor, Nalini Suparamaniam-Kallerdahl/ Vysus Group, Georg Giskegjerde/ DNV, Stig Ole Johnsen/ SINTEF & Dorthea Mathilde Kristin Vatn/SINTEF

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