

SUMMARY NOTE

HFC FORUM 16.10.14, DNV HØVIK

This Summary Note collates the information gathered from the HFC Forum workshop session regarding the update of the HF sections of NORSOK S-002. It summarises notes from four separate workshops.

Input received will be made available to the NORSOK S-002 HF Sub-group for review and consideration in the continuing revision process. It should be noted that the version reviewed in the HFC Forum workshops is a draft version/ongoing work and will probably change.

Additional options for commenting:

- Norsk Forum for Olje ergonomi, HFS, Ski. Date: 13.11.14
- Norsk Ergonomi og Human Factors Forening, Oslo. Date: to be confirmed.
- The updated NORSOK S-002 will be sent out for public comment where you will be able to comment through your company. Date: to be confirmed.

Please remember that constructive comments are of most use to the Committee e.g:

- “remove section xxx and replace with xxx, based on information in ISO xxx”
- “the following definition is commonly used and accepted for XXX. Source is XXX”

Please try to avoid comments of the following type:

“more of this and less of that”

“text does not mention this/that”

“why is this included/not included?”

WORKSHOP A

Topic: Annex C Human Factors Activities

General agreement that the activities listed in Annex C should be performed.

Location of some activities in the annexes should be reviewed. Proposed that some of the activities be relocated to Annex A General Activities (see table below). Note some of the activities proposed to be moved to Annex A already exist in Annex A. In some cases, a description of HF methods is to be found in Informative Annex F, e.g. task analysis).

Comment that HF overlaps with many other disciplines and that the activities require multi-disciplinary input.

Suggestion to include a competence and responsibility matrix along with table 3.1 (activity and project phases overview).

There was a proposal that the HF discipline shall be involved in every project activity where there is a potential for human error (includes annexes other than Annex C). [Post Meeting Note from editor: This proposal should be considered in description/ criteria for screening].

S-002 does not seem very user-friendly at the moment with some requirements in the main document (Chapter 6) and various process requirements in Annexes A-E. Some information is duplicated.

ACTIVITY	COMMENT
HFE Screening	This should just be in annex A. Currently in Annex A and C.
Situational Analysis	Suggestion to change the title of this to “GAP Analysis” so that people understand what this is about, irrelevant of discipline. This should go in the general annex A. Currently in Annex A and C.
HFE Integration Plan	This should go in annex A.
Apply anthropometric data	Is this not a part of the “Command, Control...” Activity? Agree that this is a HF activity and should be in annex C.
Functional analysis and allocation	Could this activity not be combined with Task Analysis? Agree that this is a HF activity and should be in annex C.
Task Analysis	This should just be in annex A. Currently in Annex A and C.
Job Hazard Analysis	This should just be in annex A. Currently in Annex A and C.
Safety Critical Task Analysis	Suggest combining this activity with the HRA activity. Agree that this is a HF activity and should be in annex C.
Human Reliability Analysis	Agree that this is a HF activity and should be in annex C.
Valve Criticality Analysis	This should just be in annex A. Currently in Annex A and C.

ACTIVITY	COMMENT
Skid Analysis	This should not be in annex C. Currently in annex B and C.
Physical workload/handling	This should just be in annex A. Currently in Annex A and C.
Psychosocial Evaluation	There is a reference to “solitary work” in the current S-002. Please keep this paragraph in the new S-002.
Organisation and Manning analysis	This should just be in annex A. Currently in Annex A and C.
Mental workload	Agree that this is a HF activity and should be in annex C.
Illumination	This should just be in annex A. This should not be a HF responsibility but HF should be involved.
Command, Control and Communication environments	Unclear what this activity is from its current title. Suggest that this should be changed. In the current S-002, there is reference to “safety critical workplaces” – this should be kept. Agree that this is a HF activity and should be in annex C.
Human Machine Interaction	Suggestion that this is called “HMI and Alarms”. The amount of work involved in HMI is usually underestimated in projects. Agree that this is a HF activity and should be in annex C.

Unclear where verification and validation is included. If it is in annex A, an additional paragraph should be included in annex C due to HF using different methods to other disciplines. If, however, V&V is included under the “Command, Control...” activity and “HMI” activity, then maybe a separate paragraph is not required.

WORKSHOP B

Topic: Screening activities and Competence

- General impression of importance: Positive attitude to Screening as activity and competency matrix.
- Table 3.1 in Annex C – General: needs a heading where it is clear that this is not mandatory activities, but a list of all possible activities.
- Discriminate between normative requirements and informative recommendations by using different font (italic). This will make the standard more user friendly.
- Mental Workload: A question was raised if there is a contradiction in the text screening approach – “shall be considered” – a contradiction? It was recommended to improve the text – so it does not look like a “new” study.
- Annex A, A.2.1.2 “Screening shall take place...” A definition of screening is missing. If it is a requirement – it needs to be clear what a screening is.
- The use of shall in the text is confusing and needs to be used consequently only when it is normative requirements.
- Human Reliability Analysis: Politically not recommended to use this term. Recommendation: Replace with Human Error Analysis.
- Psychosocial evaluation: This is an evaluation seldom seen done where it adds any value, and it was recommended to transfer this analysis to NORSOK S-001.
- Common terms should be Physical Ergonomics and HF (Statoil). A discussion around the use of HFE/Ergonomics did not have any end. Whatever end result -terms and definitions will be necessary.
- Competency and skill requirements are wanted, but a revision is necessary.

WORKSHOP C

Topic: HMI and Alarms

4.18 Human Machine Interface

4.18.1 Goals

Ensure Optimal HMI in order to achieve user acceptance, effectiveness, efficiency, reduced load on operator.

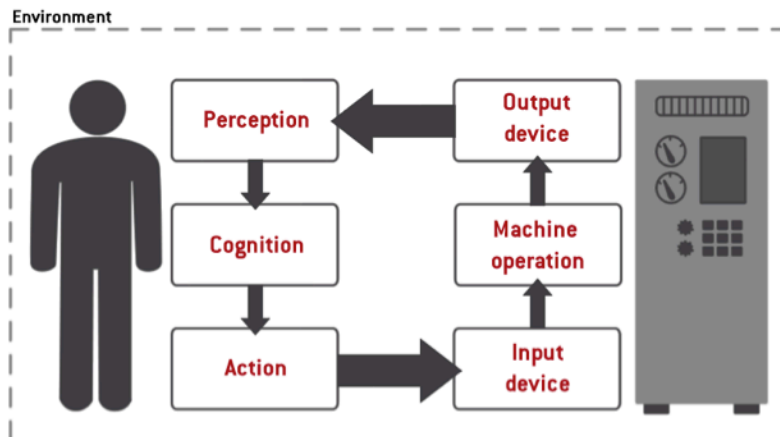
Provide Human Machine Interfaces (HMI) that:

- Reduce the probability of human error or mistakes occurring
- Support correct and efficient recovery if errors / mistakes occur
- Ensure the health, safety and wellbeing of users
- Enhance operational efficiency
- Are usable - i.e. easy to use, efficient in operation and accepted by end users
- Are adapted to the human operators perceptual and cognitive capacities and limitations
- Are adapted to all modes of operation
- Are consistent both with regards to their interaction and information elements
- Support a motivating working environment
- Avoid RSI
- Improve operators situational awareness

4.18.2 Description

The term "HMI" includes all controls and displays: software, physical, digital and analogue that the operator uses to control or monitor a function. The term "HMI" covers interfaces on individual control panels (e.g. BOP), those found in cabins (e.g. driller's cabins) and control and monitoring environments. Alarm presentation, management and operator response are included in the term "HMI".

The elements of Human Machine Interaction are illustrated in Figure 4.1.



Information from the system is provided through the visual, acoustic or haptic channels, or a combination of these. The information should be adapted to the channels for perception and presented in a manner that supports the cognitive processes of the human operator. Human control can be performed by voice, physical movement or by touch, using various parts of the human body, feet, knees, hands, fingers etc. The mandated EN 894 series (four

Dominika Predkiel 22.10.2014 13:24

Comment [1]: Participants expressed a concern that it is not clear what OPTIMAL means. Optimal for whom? Operators? Supplier? Customer? Some mentioned it may be reasonable that the standard shall describe a MINIMAL REQUIREMENT for HMI.

A better term should be discussed

Dominika Predkiel 22.10.2014 13:25

Comment [2]: Participants agreed that this list does not include one of the main goals for HMI which is EFFECTIVENESS. HMI shall ensure it does what it is supposed to do (FUNCTIONALITY wise). Effectiveness is mentioned in the first sentence, but it shall be listed in the bullet points as well.

Proposal for bullet point:
- Ensure effectiveness so that operator get the information required to accomplish his/her task

Dominika Predkiel 22.10.2014 13:25

Comment [3]: Positive feedback: This sentence is OK. We should keep general HMI definition on a high level, so that new equipment in future is covered as HMI if it is an interface of any type. See next comment.

Dominika Predkiel 22.10.2014 13:25

Comment [4]: Nevertheless, for practical reasons participants felt that it would be useful to list more examples typical for CCR design to ensure HF is involved in buying/reviewing HMI. A common example – **telecoms equipment** is usually handled separately by different discipline (Telecom), however it was noted that there is typically a HMI "bit" that shall be evaluated when new systems are ordered - but is often omitted.

Dominika Predkiel 22.10.2014 13:27

Comment [5]: This sentence should be revised. It has been noted that Management of Change is rather an organizational issue than HMI related. Participants suggested that it shall be clearly stated which parts of the alarm system is part of HMI activities.

It is clear that Alarm presentation should be included. Maybe requires terminology explanation?

Refer to only some chapters in EEMUA?

parts) describes the processes for determining the choice of input and output devices and location of these. EN 894 (all parts) shall be followed.

For displays and controls that come under the Machinery Directive, EN 614 Parts 1 and 2 and EN 894 (all 4 parts) shall apply. Visual danger signals shall be according to EN 842. EN 891 shall be applied to systems for auditory and visual danger and information signals.

The principles and design processes described in ISO 11064-5 shall be applied to the design and evaluation of Human Machine Interfaces. This entails establishing an HMI team, that as a minimum consists of formal expertise in Human Factors, interaction design, systems design, instrumentation, telecommunications, end users and end users' representatives.

Tools for ensuring a common understanding between the groups members should be used, e.g. prototypes, sketches and wireframes. The wireframes/ sketches to become more detailed as the design progresses.

During concept definition and optimisation/FEED, the activity shall include writing an HMI philosophy, a functional analysis and allocation describing functions to be performed, defining system performance (usability) requirements, allocating manual and/or automatic functions, a task analysis defining tasks based on allocated functions, and defining requirements (time, cognitive demands, etc.) for operator tasks, including information needed and the interface devices necessary to handle these tasks. Examples (sketches, prototypes, wireframes), of different conceptual alternatives shall be developed and evaluated.

The analyses shall be updated and elaborated in an iterative process to ensure that further development of requirements is in compliance with the main objectives and philosophies. An interactive model should be provided during detailed design.

The analyses and iterative design should be based on:

- Overall system goals
- Functional analysis / allocation
- Company / general Style Guide
- Experience data
- Philosophies
- Specifications

4.18.3 Validation and Verification

In accordance with ISO 11064-1, ISO 11064-5 and ISO 11064-7, a procedure for unambiguously verifying and validating the HMI iteratively throughout the design process, shall be established. The validation activities shall assess the ability of the HMI to handle all modes of operation. Validation activities shall assess the interfaces of control and communication systems, including alarms. Validation can be performed using tools such as prototypes, interactive models, checklists, or usability evaluations. Methods for validation include usability analysis, scenario analyses, walkthroughs of safety critical tasks, simulations, etc. The validation exercises should also assess the interactions with other related HMI systems. (e.g. all the drilling related control systems together). Weak points in the control system's ability to handle the different modes of operation should be identified and mitigated. The validation and verification activities shall be documented.

Alarm presentation and documentation of operator responses shall be in accordance with EEMUA 191 Rev 4, 2013.

Tactile interfaces shall follow the principles and processes described in ISO 9241 - Ergonomics of human-system interaction -- Part 920: Guidance on tactile and haptic interactions.

4.18.4 Deliverables

- Plan for HMI development and Validation and Verification, including system boundaries, & goals
- HMI Philosophy & Specification

Dominika Predkiel 22.10.2014 13:27

Comment [6]: Is this a standard expression/term? Participants felt it may refer also to information plates on the corridors. "Alarms" was proposed instead.

Dominika Predkiel 22.10.2014 13:27

Comment [7]: One of the participants suggested that we should add "unless other standards apply (for example in marine)".

We discussed that this would need to be added in many places in the document, as there is an assumption that always there is a hierarchy of documents. To be considered. Is such a statement at the beginning of the document?

Dominika Predkiel 22.10.2014 13:28

Comment [8]: All agreed that end users shall be higher up on this list. In practice it is HF, operators and systems design responsible involved in the process. Additionally other disciplines should be involved if needed (process, telecoms etc.)

Sentence should be rewritten to highlight importance of end user involvement!

Dominika Predkiel 22.10.2014 13:28

Comment [9]: This paragraph says a lot about validation but not much about verification. Should be more balanced.

Missing:
-3rd party involvement
example of performance indicators to help people to assess if system meets goals.

- HMI report detailing concepts, specifications, symbols & usability testing
- HMI-IAT & HMI- FAT
- Alarm Philosophy & Specification
- Alarm Response Manual
- HF Analyses, including Functional Analysis, Functional Allocation, Task Analysis, Job/Workload Analysis
- Concept & Detailed Designs
- Development of User Documentation
- Training

- Human Factors Plan for HMI development (including scope, goals, HMI team roles and responsibilities, design process, validation and verification activities)
- Experience transfer from Operations

- HMI Philosophy
- Alarm philosophy
- Task and function analysis, workload analysis (if not performed earlier) **ref. to other chapters in this document**
- HMI concepts (for example drawings, sketches, wireframes, markups)
- Style guide (if not company provided)

- HMI Specification
- Alarm Specification

- Review reports from detail design (for example MoM, markups)
- V&V report
- Participation in FAT/SAT

- HF close out report (including leasons learned)

Optional:

- Input to training materials
- Review / development of user documentation

Dominika Predkiel 22.10.2014 13:29

Comment [10]: This list should be revised. It is not clear what the difference is between, for example, Concept & Detailed Designs and HMI report detailing concepts.

List should preferably show deliverables in chronological order.

Proposals for a list received from all participants. To be followed up.

It has been mentioned also that task analysis and functional analysis is already done so it might be mentioned that this does not need to be done for HMI separately but some activity to focus on HMI tasks to be based on existing documents.

Dominika Predkiel 22.10.2014 13:29

Comment [11]: Not sure about this one as this is often included in HMI spec.

WORKSHOP D

Topic: Trends in Oil and Gas



DNV·GL



Group D - Trends
HFC – NORSOK S-002 Discussions

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SAFER, SMARTER, GREENER

Trends

- **Societal:**
 - International culture (exporting technology and standards)
 - Decentralisation
 - Outsourcing
 - Generation shift (competence and knowledge loss/challenge)
 - Higher focus on environment from society
 - New generation (gamer generation) how do we design for them
 - Measuring health (stress, etc.)
 - Resilience engineering
 - Focus on well-being
 - Legality and ethical concerns of measuring and recording data for well-being
 - Reorganisations
 - Multi-teams

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Trends

- **Technology:**

- Information security
- Security (terrorism)
- Public information (need for transparency)
- Whole process full cycle of operations (design - decommissioning)
- Different climates/geographical
- Focus on Deepwater and arctic operations
- Competence requirements have changed based on changes in complexity of technology and stress tolerance and mental capacity
- Adapting the physical working environment to psychosocial working environment needs
- New technology requiring situational awareness, how is that achieved
- Recording conversations, black box, during some operations
- Integrated operations
- Remote operations
- Integrating standards

Trends Summary

- **Societal:**

- Shift out of generation, gamer generation
- More focus on environment and well-being
- Increased international culture, with outsourcing and multi-teams

- **Technological:**

- New geological areas, e.g. arctic, Deepwater
- More complex technologies -> different competence needs
- More automation -> more monitoring and situational awareness
- Integrated operations, remote operations
- Recording conversations, black box

- **Financial:**

- Cost reduction
- Manning/Staffing reduction
- Control room – control centre

Trends

- **Financial:**

- Cost reduction
- Manning/Staffing reduction
- Control room – control centre

What HF-issues should be addressed in NORSOK S-002

- Lack of guidance on how to deal with product/project life-cycle (what about operation, decommissioning),
- More guidance on how to operationalise/implement the HF recommendations,
- Strengthen the requirements about user participation (early participation, relevant operational personnel, motivate them to participate)
- Difficult to follow the iterative character, in the new standard, of the design process (ISO 11064)
- Make the product user-friendly for new generations
- Prepare facilities for the future
- Security should be included in Safety
- Working Environment should follow Human Factors, not the other way around
- Do we know what functions well in e.g. control room