INTEGRATING EXPERIENCES FROM OPERATIONS INTO ENGINEERING DESIGN: MODELLING KNOWLEDGE TRANSFER IN THE OFFSHORE OIL INDUSTRY

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KEYWORDS
Knowledge transfer, operations knowledge, engineering design projects

SUMMATIVE STATEMENT
Integrating human factors and users’ experiences in design projects is a well-known challenge. This study focus on the specific challenges for transferring these experiences and how using a knowledge transfer model can help this integration on the design of high-risk productive work systems, such as offshore oil rigs.

Intégrer les expériences relatives aux opérations dans la conception technique : modélisation du transfert de connaissances dans l’industrie pétrolière extracôtier

MOTS-CLÉS
Transfert de connaissances, connaissance des opérations, projets de conception technique

SOMMAIRE
Parvenir à intégrer les facteurs humains et les expériences utilisateurs dans les projets de conception est un défi bien connu. La présente étude met l’accent sur les défis particuliers liés au transfert de ces expériences et explique comment un modèle de transfert de connaissances peut faciliter cette intégration lors de la conception de systèmes de travail productifs à haut risque sur les plateformes pétrolières en mer.

PROBLEM STATEMENT
Poorly designed workspaces result in adverse effects on occupational health and safety, as well as reduced efficiency and productivity. In large-scale engineering projects and, in special the offshore oil sector that has to face geographical and workwise distance between operations and engineering design teams, integrating human factors and transferring knowledge are key aspects when designing for better performance systems.

It is acknowledged that offshore operations are a potential knowledge source to be exploited when attempting to optimize new and existing units in terms of cost, safety and production effectiveness (Conceição et al., 2012; Johnsen, 2014), knowledge transfer being the main source of practical information during the projects development (Pagenhart et al., 1998). However, many times knowledge captured from the rigs in the form of documentation and pushed into knowledge systems is not necessarily reused on the engineering design side (Vianello and Ahmed, 2012). There is the need to translate and structure knowledge in a way that addresses the needs of the engineering designers in order for such knowledge to be successfully shared and applied (Ahmed-Kristensen and Vianello, 2015).
RESEARCH OBJECTIVE/QUESTION
Based on an in-depth empirical investigation in an offshore oil company, this study aims to provide a framework for the knowledge transfer process from operations into engineering design that helps identifying and facing the challenges for such a transfer process.

METHODOLOGY
The research was carried out as a case study in an offshore oil company. We used the empirical data collected through interviews and surveys to identify the main challenges for the knowledge transfer process based on a pragmatic 4-step framework (Figure 1).

Figure 1 – 4-step knowledge transfer framework
At a later stage, we developed a set of requirements to improve the knowledge transfer from operations into design.

RESULTS
Knowledge transfer implies the knowledge to be 1) captured on the operating units, 2) transformed into an engineering design context, 3) transferred to the appropriate project team members, and finally 4) applied throughout the design process of new installations. It is a four-step process involving challenges going from not having specific performance indicators encouraging rig workers to focus on capturing knowledge targeted to design to not having this knowledge available to be applied at the right time in the projects, making it at times impossible to implement in terms of design specifications. Challenges also pass through dealing with the large amount of knowledge registered in the systems without standards to categorise and store this knowledge, to being difficult to access and retrieve the knowledge in the systems.

DISCUSSION
Transferring knowledge and experiences from users brings human factors into play and modelling the knowledge transfer process provides a better idea of what is involved. Overall, the requirements developed based on the identified challenges point to the need to have clear procedures and standards to capture the operational knowledge, as well as an alignment of the key performance indicators related to the knowledge transfer process, since it will allow for better collaboration and communication between the two divisions. Furthermore, clear methods and resources to systematise and transform the knowledge, together with appropriate methods to make it available to the project teams are paramount.

The entire process requires a continuous flow in order to develop a permanent repository that is continuously updated and is used to optimise the design towards better system performance. The framework was developed pragmatically based on the literature and tested using a single case company in the offshore oil sector; more studies are needed to consolidate it. Furthermore, the challenges identified and the system requirements proposed should also be tested at other companies in the sector to verify their generalizability.

CONCLUSIONS
Using a framework helps to identify challenges is of importance for both practitioners and researchers, since it 1) helps developing practical requirements for improving knowledge transfer and 2) supports framing the knowledge transfer process in a systematic way, allowing for comparison within different cases towards generalising the findings.
REFERENCES
Johnsen, S. (2014) Why are cognitive human factors missing from the blunt end in the oil and gas industry? Proceedings from XI Symposium on Human Factors in Organizational Design and Management, Copenhagen, Denmark.