What now - Innovation beyond cost cutting and standardisation

Subsea Innovation Day

Bjørn Søgård, 26. April 2018
Setting the scene:
A bit of standardisation mechanism
A bit of structures behind innovation
Three examples
Setting the scene:

A bit of standardisation mechanism

A bit of structures behind innovation

Three examples
Standardisation in society

Authorities

Customer

Accredited organisation

Manufacturer

Norway
USA
Canada
EU

ISO
DIN
NS
BS

Siemens
Bosch
VW
Apple
Philips

You
Me
Schools
Society
Public companies

+++
+++
+++
Standardisation in our industry

Authorities

Accredited organisation

Customer

Manufacturer

Norway
USA
Canada
EU
+++ 

Total
Statoil
ExxonMobil
Shell
+++ 

ISO
API
DNV GL
NORSOK
+++ 

Siemens
TechnipFMC
Baker Hughes GE
Aker Solutions
OneSubsea
+++ 

DNV GL ©
04 December 2017
Where are standards being developed in our industry?

Tradition of standards being developed **collaboratively**

Accredited organisations

Customers

Manufacturers

Tripartite collaboration

Authorities/ Regulations

Government

Unions

Companies
Setting the scene:

A bit of standardisation mechanism

Three examples
Where is technology innovation happening?

Long time ago
- Defence (Combat)
  - Not price sensitive
  - Urgency
  - Technological edge
  - Quality
  - Rigid processes

Industry/Business
- Business to business
- Customer influence
- Rational objectives

Today
- Consumer tech. market
  - Price
  - Consistent Quality
  - Customer does not care as long as it works
  - Attraction and brand
In this picture, where do we fit in?

Industry

- Business to business
- Customer influence
- Rational objectives
Comparing innovation and user demands

Performance vs. Time

User demand
Product performance
Users demand
Product performance

Defence (Combat)
Industry/Business
Consumer tech. market
Innovation - differences to be aware of (I)

- In the consumer industry, manufacturers develop new features to attract market
- The consumer doesn’t care about standards as long as the product works and it complies with the law
- The customer doesn’t care about the innovation processes by the manufacturer
- The customer doesn’t know what will come next......
Innovation - differences to be aware of (II)

- In our industry the manufacturers are responding to customers’ needs
- Innovation often happens as a collaboration between the players
- Innovation is often joint financed between the manufacturer and customer
- Customers care about what standards are being used and applied
- Customers interact in the innovation processes.
What’s the motivation for Innovation? A company perspective

- Why do companies invent?
  - To be better positioned in the market

- Two routes!
  - To have products with better performance than competitors
  - To make things more efficient than competitors to gain market share or being cost competitive

- Innovation cannot be ‘Charity’, important to maintain mechanism for motivation.
A nation’s technology leadership

Innovation / patents

Cost

Market

Manufacturing
Example from PV Industry

What is the dominant factor here? Energy/m² ?

What is dominant factor here? Energy/NPV ?

By Proudgreenhome
Sun&Wind energy
Setting the scene:

A bit of standardisation mechanism

A bit of structures behind innovation
DNV GL Industry Outlook: Subsea is important going forward

IHS CERA Upstream Capital Cost Index

Source: NPD
The largest increase in R&D spending in four years

Respondents’ expectations for changes to their companies’ R&D and innovation spending, by year
DNV GL Industry Outlook: Top 10 priorities for R&D and innovation in 2018

- **37%** Digitalization
- **29%** Subsea
- **20%** Enhanced oil recovery
- **16%** Smart emission reduction
- **12%** Energy storage
- **36%** Cyber security
- **24%** Pipelines
- **19%** Advanced materials
- **16%** FLNG
- **12%** Power to gas
Towards a standardized approach for qualifying subsea systems

- How can confidence in new subsea technology and systems be demonstrated faster and more efficiently?
- How can already qualified technologies be re-qualified in an effective manner?
Round-table workshops with industry players: Industry TQ user forum
Doing TQ more effectively and faster

- Improve technology qualification with *systems*- and *software* perspective
- Standardise the TQ approach for allowing re-use of data
- Uniform industry understanding and knowledge sharing between the stakeholders
- Increase the integration of TQ with the project and product engineering development / systems engineering activities
TQ 4.0 – Web based tool for qualifying new technology

REASON in TQ
Can you trust the conclusion?

Efficiency through digital collaboration
Safety 4.0 – Responding to industry needs

- **Subsea is important**
  - Many projects
  - Large export industry

- **New technologies**
  - All-electric ++
  - Novel process ++

- **Demonstrating safety**
  - No personnel
  - Non-explosive

- **Value creation**
  - Enable new concepts
  - Efficient and relevant
Example: Assuring safety for more integrated complex systems

- Traditional safety philosophies are BASED upon separation between the production- and safety systems
- New solutions may call for more integration and require supplement to existing safety philosophies

Separation & independence  Integration & complexity

Suitability of current framework  New framework needed
All-electric subsea technologies – improvements at lower costs

The all-electric technology

- Replacing wellhead, sub-surface safety valve and associated command system with all-electric technology
- Simpler assembly – less complex solution
- Different failure modes

Environmental and safety improvements

- Hydraulic pipes replaced by power cables with less risk of spills
- Removal of high-pressure equipment topside improves safety

Cost reductions*

- Replacing hydraulic pipes with an electricity cable over a distance of 30 km reduces costs by 15%.
- An electrical version of the well’s own equipment is expected to generate additional savings of 10%.
- Enabling further digital innovations may generate total cost savings of 30-40%

Shaping the future of digital standards, requirements- and information management

Initiated by the Sector Board Petroleum
Background

- Responding to ‘**NORSOK Analysis project**’, KonKraft, Standard Norway’s Sector Board Petroleum has engaged DNV GL to establish a Joint Industry Project (JIP) aiming at revising and digitalising NORSOK’s Z-standards for Technical Information.
# Deliverables

<table>
<thead>
<tr>
<th>Name</th>
<th>Type of delivery</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digitalized Z-TI requirements (Z-018, Z-001)</td>
<td>Software (Machine understandable)</td>
<td>Proposal for Z-TI requirements understandable to computers. Available in web based services</td>
</tr>
<tr>
<td>Documents (Human readable)</td>
<td>Proposal for Z-TI requirements readable to human beings. Z-TI for.</td>
<td></td>
</tr>
<tr>
<td>Documents (Human readable)</td>
<td>Proposals for discipline vocabularies readable to human beings. Generated from digital content in web based services.</td>
<td></td>
</tr>
</tbody>
</table>

* Will be fed into relevant international standards in ISO/IEC (For example ISO 15926)
«Jeg vil også nevne NORSOK-styrets prosjekt for å digitalisere og effektivisere arbeidet med dokumentasjon og krav i designprosessen. Dette initiativet er viktig for å oppnå varige forbedringer. Jeg vil oppfordre næringen til å slutte opp om prosjektet.»

«Jeg vil også nevne NORSOK-styrets prosjekt for å digitalisere og effektivisere arbeidet med dokumentasjon og krav i designprosessen. Dette initiativet er viktig for å oppnå varige forbedringer. Jeg vil oppfordre næringen til å slutte opp om prosjektet.»

ANBEFALING FOR DIGITAL FELTUTVIKLINGSPROSESS

- Aktørene i feltutviklingsprosessen bør etablere et målrettet samarbeid for hurtigst mulig å hente ut effektene av digitalisering og datautveksling (se også anbefalingen om initiativ for digitalisert samhandling).
- Standardisert digital anleggsinformasjon bør tas i bruk, slik at hele verdikjeden kan kommunisere gjennom 3D-modeller og databaser og på sikt på digitale tvillinger. I arbeidet bør man bruke erfaringer fra bygningsindustriens samarbeid om digitalisering – buildingSMART.
- En del av arbeidet bør bidra til å akselerere den pågående digitaliseringen av NORSOKstandardene – spesielt NORSOK Z-TI.
Significantly contributing to reaching the goal of a break even price below USD 20 per barrel

Linking technical information through the value chain to digital requirements enables:

- Digital work process
- Automatic generation of requirement sets
- Automatic check of requirements (Verification)
- Increased information quality through common industrial vocabularies
- Improved common logistics and shared storage
- Re-use of information between different players and project life cycle phases
- Common digital twins

Exploration  Drilling  Feed  Detailed engineering  Procurement and const.  Operation  Decom
The problems are......

- Requirements are analogue and company specific
- Documentation is company specific
- Software solutions are proprietary
- Verification of requirements are manual
- Re-use of concepts and solutions are analogue
Solution: Common digital requirements for Technical Information

- Requirements represented in a language understandable to computers and humans
- Individual requirements are uniquely referable and identifiable.
- Digital Information can be linked directly to digital requirements
- Complete consistency checks using automated reasoning.
- Enable automated verification.
Summary

- **Standardisation** and **innovation** can go hand in hand

- **Regulations** and **standards** are best made as a collaborative effort

- Our **innovation power** are dependant on playing together.