Standardization of equipment specifications for procurement

JIP33
Context
Between 2010-2014, 75% of large E&P projects exceeded budget by 50% on average, and 50% of projects exceeded schedule by almost 40%.

Objective
The CPC initiative seeks to drive a structural reduction in upstream project costs and schedule improvement with a focus on industry-wide, non-competitive collaboration and standardization.

Vision
The vision for the industry is to standardize specifications for procurement for equipment and packages, facilitating improved standardization of major projects across the globe.
Standardization is a key lever we can pull as an industry to structurally reduce large capital project lifecycle costs.

### Average breakeven cost for an example major capital project

<table>
<thead>
<tr>
<th>% of total</th>
<th>2014 breakeven</th>
<th>Supply chain compression</th>
<th>Demand reduction and design simplicity</th>
<th>2016 breakeven</th>
<th>Standardization and operator collaboration¹</th>
<th>Best in class breakeven</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100%</td>
<td>25-35%</td>
<td>10-20%</td>
<td>45 – 65%</td>
<td>10-20%</td>
<td>25 – 55%</td>
</tr>
</tbody>
</table>

Compression savings are big, but may not last when prices recover. Existing efforts to optimise projects have captured value since 2014. Step change opportunity we have not yet captured. Structural changes are critical for the economic viability of major projects, and will create benefits in any price environment.

1. Includes a portion of cost of quality savings

Source: McKinsey Energy Insights
Successful standardization initiatives in other sectors were launched in times of disruptive market environments

<table>
<thead>
<tr>
<th>Industry</th>
<th>Semiconductors</th>
<th>Automotive</th>
<th>Data servers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disruptive market</td>
<td>Rising costs and market share decline due to competition from Japanese OEMs</td>
<td>Rising costs from bespoke electronics solutions and declining profitability</td>
<td>Rising capex and opex on server facilities due to bespoke and antiquated designs</td>
</tr>
<tr>
<td>conditions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact of standardization</td>
<td>▪ 14 U.S. companies created industry consortium, SEMATECH</td>
<td>▪ 5 automakers create standards organisation, ASAM</td>
<td>▪ Facebook and four other companies create non-profit Open Compute</td>
</tr>
<tr>
<td></td>
<td>▪ Generated 60+ standard specifications, resulting in 50% cost reductions for certain components</td>
<td>▪ Creates standardized software testing and interoperability methods</td>
<td>▪ Shares and builds hardware specifications</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ Industry-wide reduction in testing costs per vehicle</td>
<td>▪ $2B savings for Facebook alone between 2011 and 2014</td>
</tr>
</tbody>
</table>
| Source: Expert interviews, ASAM, Open Compute, Business Insider, SEMATECH academic research
Mutual benefits

Standardization will create a mutually-beneficial outcome for industry by addressing safety, cost, schedule, quality, reliability.

- **Safety**
  - Familiarity with designs over time
  - Safety transfers between projects

- **Cost**
  - Save time spent writing specs
  - Minimum standards
  - Est. lifecycle savings: 10-20%

- **Schedule**
  - Rapid procurement
  - Est. lead time reduction: 25-40%+\(^1\)

- **Quality**
  - Continuous improvement and innovation of designs

- **Reliability**
  - Elimination of inconsistencies in performance

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1. Estimated reduction from supplier based on Phase 1 LV switchgear specification and expert interviews for ball valves and subsea trees
Bids and proposals

**Standard bid template and clarification process**
- Fewer questions to answer
- Less deviation requests
- Increased focus
- Quicker response and decisions possible

**Saved time, resources and costs**

Engineering and manufacturing

**Harmonized engineering / more certain information**
- Streamlined design and approval process
- Fewer last-minute changes / interruptions
- Fewer inspection hold points / quicker release
- Repeatability enables continuous improvement

**Enhanced efficiency and quality of supply**

Installation and commissioning

**Streamlined equipment simplifies fleet management**
- Reduced wiring / testing / tools / spare parts
- Fewer items on secondary punch list
- Condensed commissioning time
- Reduced drawing updates required

**Enhanced reliability and improved safety**

**JIP33 Benefits to the Supplier**

Optimization through simplification and standardization
Lots of different standards developing organizations ….. and lots of different Operator Specifications!

We need to focus!
Evolution of Operator Company specifications - IOGP Reports 450, 500 & Madrid workshop 2014:

- Average number of specifications per company: 466;
- Average number of pages: 28

Change needed:
Standardise Operators specs
Establish JIP33
Where it all started

Future of Oil & Gas

Common Standardization Concept
Capital Project Complexity

- The Forum engages the foremost political, business and other leaders of society to shape global, regional and industry agendas
- The O&G Community at the WEF is composed of NOCs, IOCs and Independents representing approximately 40% of global oil supply as well as Services and Equipment companies
## World Economic Forum

The Forum engages the foremost political, business and other leaders of society to shape global, regional and industry agendas. The Annual Meeting in Davos convenes leaders from business, government and civil society to discuss the most pressing issues.

## Oil & Gas Community

The O&G Community at the WEF is composed of NOCs, IOCs and Independents representing approximately 40% of global oil supply as well as Services and Equipment companies.

## Capital Project Complexity

Since 2014, the O&G community has worked to address issues associated with budget and schedule overruns of large upstream projects. Over time, the focus has evolved towards revisiting standardization to improve the economics of hydrocarbon production.

## Team

The collaboration is shaped by:

- **A Steering Committee**: Select group of CEOs from major producers. Committee meets around 4 times a year (2 physically/ 2 virtually).
- **The Working Group**: Group of senior executives (e.g. Chief Engineer, Head of Projects etc.) who interact regularly in order to execute and further shape objectives and next steps.
- **The Project Team**: WEF staff who manage and support the project.
Large E&P projects budget and schedule overrun between 2010-2014

Average Budget and Schedule overrun per region
- **Budget**
- **Schedule**

- **90.5 years** of absolute total schedule overrun
- **$402 Billion** absolute total budget overrun

- **37%** average global schedule overrun
- **52%** budget overrun

- **55%** of all projects exceed schedule
- **76%** of all projects exceed budget

Source: WEF, Accenture
“The old way” of procuring equipment

Operator Technical Practices

Industry Standards

Generated for procurement by engineering contractor

- Project Specs
- Data Sheets
- Project Quality Requirements
- Project Document Requirements

Suppliers

Project bespoke/customized
Company and Industry ‘Standards’
Standardized documents
“The new way” with standard specs

Generated for procurement by engineering contractor

- Operator Technical Practices
- Industry Standards
- Standard Project Specs
- Standard Project Quality Requirements
- Standard Project Document Requirements
- Data Sheets

Rapid Learning

- Project bespoke/customized
- Company and Industry ‘Standards’
- Standardized documents

Suppliers

International Association of Oil & Gas Producers
IOGP’s Members produce 40% of the world’s oil and gas – safely, efficiently and reliably

IOGP works on behalf of the world’s oil and gas companies and organizations to promote safe, responsible and sustainable exploration and production.

The Association encompasses many of the world's leading publicly-traded, private and state-owned oil and gas companies, industry associations and major upstream service companies.

- 78 Member Companies
- 3 offices – London, Brussels, Houston
Standards Committee

• Supports development and promote value-added international standards that are recognized globally and used locally worldwide

• Maintains Standards Solution

• Aims to harmonize Operating company supplementary specifications

• Aiming to strengthen collaboration between IOGP, API, CEN, ISO and others

• Pushing for alignment on standards

• Actively engages and drives implementation

More information at www.iogp.org/international-standards
How do we drive costs down?

Simplification
- Design-to-cost – always minimum solution as starting point
- Drive for significant efficiency improvements in all cost

Standardization
- Standardize on cost effective design and limit variations
- Extensive effort to remove company specific requirements

Industrialization
- Maximize use of industry standards and supplier solutions
- Systematically strive for re-use of the Harmonised Industry Specification
JIP33 Mandate & process

Develop standardized equipment specifications for procurement

Sub teams must understand the cost and justify the safety or business value where proposed requirements exceed minimum proven industry practice.

**Draft**: Created by the JIP sub teams, supported by KBR technical experts, based on:

- The participating operating companies current design and procurement specifications.
- Supplement relevant industry standards.

**Revision 1**: Issued by IOGP following review and alignment amongst the JIP members’ technical experts.

**Revision 2**: Issued by IOGP following review and feedback by suppliers.
Requirement Rose

Source: Tom Eddy Johansen Technip FMC
JIP33’s vision for the industry is to unlock significant value and drive a permanent reduction in project costs through use of industry-level, global technical specifications for procurement of bulk materials, packages, modules and potentially, even projects.
JIP33 Phase 1 equipment specifications for procurement

**Ball valves**
IOGP S-562 is based on API 6D 24th edition Specification for pipeline and piping valves.

**Subsea xmas trees**
IOGP S-561 is based on API Spec 17D subsea wellheads and XT requirements.

**Low voltage switchgear**
IOGP S-560 is based on the IEC 61439 low-voltage switchgear and controlgear assemblies.

**Piping material**
IOGP S-563 is based on NORSOK M-630 datasheets.

Specifications have been reviewed by suppliers:

- AMPO
- PENTAIR
- Aker Solutions
- ABB
- EATON
- Rockwell International
- CAMERON
- Score Group plc
- OneSubsea
- Proserv
- SIEMENS
- Valvatek
- Perar
- Valvitalia
- DRIL-QUIP
- GE
- Oliver Valvetek
- Powell Valves
JIP33 Phase 1 – proving the concept
Status as of January 2017

Achievements

Completed **proof-of-concept** by producing 4 standardized specifications for procurement.

Developed guidance document on supporting **cultural change**.

**Documented learnings** from proof-of-concept phase.

Established **Engineering Leadership Summit (ELS)** to drive second phase.

<table>
<thead>
<tr>
<th>Phase 1 specifications</th>
<th>JIP33 members planning to implement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ball valves</td>
<td>100%</td>
</tr>
<tr>
<td>Subsea xmas trees</td>
<td></td>
</tr>
<tr>
<td>LV switchgear</td>
<td></td>
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<tr>
<td>Piping material</td>
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0%
What are the savings on pilot specifications and what is the potential value from a scale up?

Industry-wide savings potential from pilot specifications

<table>
<thead>
<tr>
<th>Ball valve</th>
<th>$250-750M</th>
<th>40% schedule compression</th>
</tr>
</thead>
<tbody>
<tr>
<td>$250-750M</td>
<td>(10-30%)</td>
<td></td>
</tr>
<tr>
<td>annual savings potential</td>
<td>compression</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subsea Christmas tree</th>
<th>$1,000M+</th>
<th>40%+ schedule compression</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1,000M+</td>
<td>(25%+)</td>
<td></td>
</tr>
<tr>
<td>annual savings potential</td>
<td>compression</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Low-voltage switchgear</th>
<th>$200M+</th>
<th>25%+ schedule compression</th>
</tr>
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<tbody>
<tr>
<td>$200M+</td>
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Current status and realized value

- One operator mentioned adoption would save internal engineering to develop own company specification
- Operators have asked suppliers to evaluate bespoke design against standardized spec; received quotes with 20-25% savings
- Procured by Woodside for an FPSO refurb, with confirmed savings of 13%
- BP implemented on an active project; supplier cited reductions in cost, footprint and weight by at least 10% each, and lead-time by up to 25%

Source: IOGP, Rystad, Fredonia, Markets & Markets, Expert interviews, Operator interviews
Switchboard example

When defining “requirements”
✓ Adopt global best practice (OPS)
✓ Supplement only where justified on the basis of:
  ✓ Technical integrity/process safety
  ✓ Lifecycle cost benefit

Woodside’s adoption of the JIP33 LVSG supplement to IEC ticks all the boxes !!!!!
Feedback from supplier:
• 10% cost reduction
• 4 weeks schedule reduction
• Additional benefits:
  • Length – 13.5% reduction
  • Weight – 10.0% reduction
  • Delivery ex-works – 26.0% reduction
  • Starter component simplification – 50.0% reduction
Collaboration amongst major operators to identify, align and sponsor activities such as standardisation is key to our sector becoming competitive, whilst maintaining safety as our number one priority.

The engineering leadership summit brings together the heads of engineering from major operator companies who will lead and drive a collaborative engineering agenda across the industry. This is supported by the world economic forum capital value complexity work stream.

Other engineering areas where collaboration will drive value in the Oil & Gas sector
To be discussed at the periodic engineering leadership summit meetings.

Activities agreed and aligned:

**Standards**
Alignment and progression of the industry and international standards.
Actions:
- Aligned operators’ position and key messages on standards document to be created and agreed.
- Facilitate alignment of API and ISO.
- Create the ‘Operators preferred standards’ list.

**Standardisation (JIP33)**
Harmonisation of company requirements to develop standardised equipment specifications for procurement.
Next steps: Consolidate JIP33 proof-of-concept and increase the scale of the scope and visibility of the effort.
Mission & aims

To promote the development of a harmonized listing of the standards recommended and supported by oil and gas sector operators through a dedicated “Operators Preferred Standards Task Force”.

The principle deliverables will include:

✔ Aligned definition of standard type, discipline and application categories
✔ Recommended list of preferred standards from:

Organisations making standards (>180)

✔ Prioritized listing of opportunities to improve the identified standards portfolio
✔ Management protocols

See “Operators’ position and key messages on standards” document http://www.iogp.org/
Preferred standards used locally worldwide

Adopt best practice global standards
(ISO, API, NORSOK etc....)
Supplement only when justified for safety or life cycle cost benefit

IOGP-ISO Poster to be superseded by "Operators Preferred Standards Poster"
**Workstreams**

- Adopt specifications across the industry, embed the culture change and work the communications plan.
- Understand the value of standardization and implement KPIs for individual companies and industry as a whole.
- Improve the ball valve and subsea xmas trees specifications.
- Create further procurement specifications.

**Specs to be delivered mid-2018**

- Air compressor packages
- Ball valves (Revision of IOGP S-562)
- Centrifugal pumps
- Gate valves and globe/ check valves
- HV switchgear
- Line pipe for critical service
- Offshore cranes/pedestal cranes
- Pressure vessels
- Shell and tube heat exchangers
- Subsea trees (Revision of IOGP S-561)
- Subsea tree configuration “top down”
- Information and quality management
JIP33 Phase 2 - Structure

Vision and Strategy

Management

Governance

Steering Committee
Ian Cummins, BP (Chair)

Project Manager
Phil Keen, Aker Solutions

IOGP Editor

IOGP JIP Administrator

Delivery

Admin Support
Eva Meinich

Document Control
TBA

Technical Specialist Support

Information Management
Chris Mitchell

Quality Management
Alan Roberson

Materials
Andrea Gregori

10 x Work Groups (sub-projects)

Work Group Chair
See Table

Lead SME

SMEs

Work Group | Chair | LSME
--- | --- | ---
1. Pressure Vessels | David Gudgeon, Eni | Martin Swinger (AKSO)
2. Centrifugal Pumps | Fabio Micchelini, Eni | Peter Zakis (AKSO)
3. S&T Heat Exchangers | Tim Griffin, Eni | Martin Swinger (AKSO)
4. Air Compressor Package | Peter Clark, Shell | Arup Ray (AKSO)
5. Line Pipe | Lars Magne Haldorsen, Statoil | Ardian Fanida, Total
6. Offshore Cranes | Ben Finlay, Woodside | Julien Dunand-Chatellet (Total)
7. HV Switchgear | Justin Mason, BP | Martin Gillard, Shell
8. Gate / Check Vales | Loic Deneuvile, Total | Tony Smart, Shell
9. Subsea tree “top down” | Gordon Budge, BP | Giorgio Pastore, Eni
10. Information & Quality | Ted Fletcher, Woodside | Chris Mitchell / Alan Roberson
Other sector standardization efforts provide lessons learned on what is critical for a successful scale up

- Critical mass needed for success requires leadership from a few “champions”
- Executive leadership with “eyes on the prize” can break logjams and speed the process
- Engagement of subject matter experts with structured time is critical – ensures standards can be progressed efficiently
- Consensus can be the goal, but clear rules on voting procedures, organization roles and timelines are critical for success

Source: Expert interviews