How DNV GL is supporting the industry to be more cost efficient

*DNVGL-RP-O101: Technical Documentation for Subsea Project – An industry collaboration*

GCE Breakfast Seminar
27 September 2016
Petter Myrvang, Bente H Leinum
Content

• Standardization: Introduction and Background

• Presentation of DNVGL-RP-O101 ‘Technical Documentation for Subsea Projects’ -project delivery

• Implementation - how to contribute?
2013: Subsea Standardization Workgroup

• This joint industry initiative is sponsored by KonKraft and the Norwegian Oil and Gas Association
• The objective is to reduce costs and delivery times by increasing standardization
• It was intended to be a further step in the ‘industrialization of the subsea sector’

Operators
- ExxonMobil
- ConocoPhillips
- bp
- TOTAL
- Shell
- Statoil
- Marathon Oil
- Wintershall

Focus Areas Selected
1. Unified Specifications and QA/QC for subsea forgings
2. Subsea component catalogue with configurable solutions
3. Universal Workover systems
4. Brownfield subsea re-engineering
5. Standardized subsea documentation
6. Compliance with established equipment standards

Suppliers
- FMC Technologies
- Aker Solutions
- Cameron
- GE
“The preparation and provision of client documentation can be a significant element of overall project cost. The major cost driver is the lack of standardization of the industry approach to documentation. There are multiple ways to document subsea equipment, and different operators and suppliers have over the years developed their own ways of recording, structuring and describing information concerning subsea equipment. Document types and names can have many different meanings, content may vary, uncertain terminology might be used, and client specific formats are the norm. And very often, identification and document locations are poorly defined or unclear to the user.”

‘Norske Olje og Gass, Report on Norwegian Subsea Standardization 2013’
Petroleum Safety Authority PSA demands action (2015)

Collect real facts from industry

Issue new requirements and standards for industry stakeholders
(JIP Std Subsea Doc)
Status PSA documentation Project (2016)

Growth in offshore documentation addressed:

Factors underlying a sharp rise in documents generated from operations on the Norwegian continental shelf (NCS) are identified in a new report from the Petroleum Safety Authority Norway (PSA) – 08.09.2016

- Ny rapport om årsakene til økt dokumentasjon – Petroleumstilsynet

- Extensive documentation in the petroleum industry could represent a possible safety risk,” Bache emphasises. “Key data needed for prudent and efficient operation of the facilities can drown in the flood.

- “At the same time, it’s important to have adequate and timely information in areas which are significant for safety.”
A broader view on standardization

Streamlining standards

From corporate to global standards

Project replications/repeat-execution

Collaboration

Governance
DNVGL-RP-O101: Technical Documentation for Subsea Project
Incentive (Why)

- The aim of this Recommended Practice (RP) is to facilitate the standardization of the technical documentation required for a typical subsea field development project.
- The RP details a set of essential documentation with the aim of reducing the volume and varieties of documentation transferred between the involved parties.

Scope of work (What)

- Establish the requirements for technical documentation;
  - during the Engineering, Procurement and Construction (EPC) phases
  - for start-up and operation of a subsea field
- Establish a mindset to assist the industry in working more cost effectively in terms of document review, handling and management.

Value proposition (Impact)

- By providing clear expectations between all parties involved, duplications, misunderstandings and unnecessary work can be avoided. The RP encourages a larger extent of reuse of subsea documentation
- Opportunities for cost savings and increased project value can be achieved by setting the expectations of improved quality and predictability of the subsea documentation.

Contacts: Bente Helen Leinum
bente.leinum@dnvgl.com

Publication date: May/June 2016

Entry into force: Immediate after publication

Operators | Contractors | Others
--- | --- | ---
Centrica | Aker Solutions | DNV-GL
Suncor | StatOil | NorskSpirit
GDF Suez | FM C | BrightPort
Subsea 7 | Oceaneering | Subsea Valley
### JIP Std Subsea Doc participants pr.date

<table>
<thead>
<tr>
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<th>Type</th>
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JIP Organisation

Chairman and Steering Committee

DNV GL
Project Sponsor

DNV GL
Project Manager

Trade Organizations
Subsea Valley, NCE

Working Groups
Admin Requirements
System Engineering

Advisors
Executives
Contacts (326 names)
Press & Media
Other JIP Groups

Executive Group &
Public Relations
Standardized subsea documentation JIP

Link to JIP project’s home page:

Deliverable: DNVGL-RP-O101

Technical documentation for subsea projects

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Objective

- Establish a minimum set of required documentation for subsea development projects (from the project phase and during the life cycle phases of a subsea production system) to;
  - allow early understanding of required documentation for all parties
  - reduce variations and versions of the same information

- Establish a mindset helping industry to work more cost effective in terms of document review, handling and management.

- Enabling reuse of existing documentation

- Reduce the number of transmitted documents in the entire value chain by increasing the numbers of retained documents at Contractors
Scope of the RP

The scope includes engineering, procurement, manufacturing, testing and mechanical completion and applies to:

- Permanently installed subsea equipment
- Temporary equipment delivered to Operator (lifting and transportation equipment, intervention equipment and tooling)

The main assemblies and equipment within the battery limits are:

- Wellhead System
- X-mas tree System
- Manifold and Subsea Structures
- Subsea Control System
- Static and Dynamic Umbilicals
- Flexible Risers and Flowlines
- Rigid Pipelines
- Tie-in System
- Lifting and Transport Equipment
- Intervention and Tooling

(Referring to ISO 13628-1)
Illustration of documentation transmittal between Operators, System suppliers and Suppliers

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App. B  Sub-system & assembly level - required documentation ...................... 21
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App. D  Document descriptions ................................................................. 81
DNVGL-RP-O101 is independent of company systems and work processes.
The JIP Std Subsea Doc Recommended Practise (RP) will contain:

1. Standard list of subsea equipment
2. Standard list of subsea documentation
3. Minimum list of equipment documentation
4. Standard definitions and admin requirements
..Resulting in the following table in the RP

<table>
<thead>
<tr>
<th>Sub-system, assemblies and equipment functions</th>
<th>Document type:</th>
<th>Design report</th>
<th>Dispatch dossier</th>
<th>FAT procedure</th>
<th>Functional design specification</th>
<th>General arrangement drawing</th>
<th>Manufacturing and quality control LEC</th>
<th>Operation and maintenance manual</th>
<th>Product data sheet</th>
<th>Scope of supply drawing</th>
<th>Spare parts interchangeability register</th>
<th>Stacking drawing</th>
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<td>WELLHEAD SYSTEM</td>
<td>NOTES</td>
<td>N3</td>
<td>N1</td>
<td>N5</td>
<td>N4</td>
<td>N4</td>
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<td>X</td>
<td></td>
<td>O</td>
<td></td>
<td>O</td>
<td>O</td>
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<td>O</td>
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<td>O</td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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</tbody>
</table>

**NOTES:**

- N1 Dispatch dossier for each batch of delivered items
- N2 Not used
- N3 Wellhead fatigue and deflection analysis shall be covered in design report. Design reports shall be issued to operator or to third party for verification unless otherwise agreed in contract.
- N4 Information covered by product data sheet shall be included in OMM. Outline installation procedure shall be included in OMM or issued as a separate document.
- N5 Corrosion caps are installed on wellhead when no Xmas tree is installed.
- N6 Manufacturing and quality control records shall be available during the life of the field and are either retained by supplier or sent to purchaser. See Table B-11 and Table C-3 for details.
- X This is documentation that is covered by the documentation for the sub-system (wellhead system)
- O Documentation required for the project phase - to be transmitted from system supplier to operator
- R Documentation to be retained at system supplier during project execution
- X Documentation also required for the operational phase - to be transmitted from system supplier to the operator during the project phase
Table A1 to B10 (Operator – Contractor)

**Agreed minimal (required) list of documentation**
(by Operators, Contractors and Suppliers)

Less Doc Types

Less Req. Docs

Agreed
List of Systems & Functions
Retained (R), submitted (S) and generic document (G)

System supplier/Supplier

Operator
## Example tables for retained, sent and generic documentation

<table>
<thead>
<tr>
<th>Categories</th>
<th>Document Types:</th>
<th>Notes</th>
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<tr>
<td></td>
<td>Assembly Drawing</td>
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<tr>
<td></td>
<td>Bill of Material (ORM)</td>
<td>6</td>
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<tr>
<td></td>
<td>Cable / Schedule list</td>
<td>7</td>
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<tr>
<td></td>
<td>Design Specification</td>
<td>19</td>
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<td></td>
<td>Electro-Mechanical Drawing</td>
<td>20</td>
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<tr>
<td></td>
<td>ENEA Report</td>
<td>28</td>
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<td></td>
<td>General Arrangement Drawing</td>
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<td></td>
<td>Hydraulic Schematic</td>
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<td></td>
<td>Interface Drawing</td>
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<td></td>
<td>Manufacturing Drawing</td>
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</tr>
<tr>
<td></td>
<td>Material Specification</td>
<td>56</td>
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<td>Operation and Maintenance Manual (OMM)</td>
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<td></td>
<td>Preservation and storage Instructions</td>
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<td>Product Data Sheet</td>
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<td>Safety Data Sheet</td>
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<td></td>
<td>Software Documentation</td>
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<td></td>
<td>Transport and Handling instructions</td>
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<td></td>
<td>Qualification test procedure</td>
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### DOCUMENT REFERENCES:

| DOCUMENT REFERENCES: | 4 | 6 | 7 | 19 | 20 | 28 | 38 | 45 | 49 | 51 | 56 | 59 | 66 | 75 | 86 | 87 | 96 | 105 | 107 | 113 | 88 | 89 |
|----------------------|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Notes:               | N10 | N8 | N16 | N20 | N19 | N13 | N19 | N29 |

### EQUIPMENT

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<th>Subsea valves</th>
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<tr>
<td>Hydraulic actuators</td>
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<tr>
<td>Electrical actuators</td>
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<tr>
<td>Large bore valves (2&quot; and above)</td>
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<tr>
<td>Choke valves / Control valves</td>
<td>N12 R R R G G S G S R S S S S S G</td>
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</table>

### LEGENDS:

- **G** GENERIC DOCUMENTS - Generic documents for materials, components and equipment. These documents are part of the Supplier’s standard documentation for design, manufacturing and testing. To be sent to purchaser for information or review as part of first PO only. Any intellectual property rights to be agreed between the parties. Changes to these documents may result in new part numbers.

- **R** RETAINED DOCUMENTS - Documents prepared by Supplier and retained by Supplier or at a second or third party as agreed between the contract parties.

- **S** SENT DOCUMENTS - Documents sent by Supplier to Purchaser for info or review. Some of these documents are part of the sub-system documentation sent to Operator. Sent (S) documents include generic (standard) and product specific documents. Generic documents should be identified by the Supplier.
What O101 say and not say......

DNV GL RP O101 does not say anything of:

1. Document content (would like to detail out standard ToCs)
2. Quality of the document
3. Acceptance criterion to functionality for the products
4. Fit for purpose of the component or equipment (in a larger system)
5. Meeting quality objectives for the product or measure the quality towards a design basis

- However, Appendix D describes the listed documents with a description of what the content is expected to be and the purpose of the documents.
Benefits

- Establish a minimum set of required documentation for subsea development projects will;
  - allow early understanding of required documentation for all parties
  - reduce variations, versions and duplication of the same information
  - increase the use of unified definitions
  - reduce inconsistency
  - increase predictability
  - Increase the use of generic/standard documents
  - increase quality
  - Reduce the number of engineering hours
  - less exchange of information
  - less administration
  - less documents
  - reduce the costs
The way forward (2016)
### Timeline: Delivery of Project Report and DNV GL RP

<table>
<thead>
<tr>
<th>Delivery</th>
<th><strong>Project Specific RP (Previous RP-0071)</strong></th>
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### 2016 SoW - ‘Expert Group’

<table>
<thead>
<tr>
<th>Company Name</th>
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<tr>
<td>DEA Norge AS</td>
<td>• Give the participants of the JIP the possibility of having an impact on the final DNVGL-RP-O101</td>
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<tr>
<td>Det Norske Oljeselskap ASA</td>
<td>• Facilitate a joint effort in order to market and implement the launched RP in the industry</td>
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<td>FMC Technologies</td>
<td>• Discuss and evaluate feedback and experience gained by the companies during 2016 and expose further improvements/updates of the RP</td>
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<td>PSA</td>
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</table>

WS1 – External Hearing  
WS2 – Release and Marketing  
WS3 – Feedback
Implementation approaches...
Into the heart of implementation – need for collaboration
No implementation – no benefits

Part of the learning process is to collect facts from todays situation, estimations and actual implementation.

- Todays facts
- Estimated benefits
- Experienced facts (from actual implementation)
- Calculated facts

New Doc
Reused Doc
Standard Doc
Reviews Doc
Engineering Hours
DC Hours
Overall Cost
# Operation and maintenance (OM)

Technical and professional requirement, TR2381, **valid from 2015-05-13**

## LCI Requirements

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<th>Reference</th>
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<td>General Arrangement Drawing</td>
<td>1.15</td>
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<td>LCI 1</td>
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<tr>
<td>Installation, Operation and Maintenance manual (OM manual)</td>
<td>1.15</td>
<td>PDF</td>
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<td>X</td>
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<tr>
<td>Manufacturing Record Book (MRB)</td>
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<td>LCI 2</td>
<td>X</td>
<td>X</td>
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<td>Single line diagram (Supplier)</td>
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<td>LCI 2</td>
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Views and trends from one of the JIP Members (Operator)

- Tested the applicability of RP O101, resulted in 86% matching for the selected project
- Potential to reduce the amount of reviews for Operator with 42% and for Contractor with 49%
- Interest in reusing documentation between projects
- Interest in copying documentation within projects
- Less transactions
- Improving DC/DM working procedures, emphasize on collaboration

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Total Docs in MDR</th>
<th>Total Docs in this XL</th>
<th>Found in RP</th>
<th>Not found in RP</th>
<th>Optional Docs (or Toplevel)</th>
<th>G1/R</th>
<th>G2/S</th>
<th>Not found in G1/R Match%</th>
<th>Average reviews/Personnel</th>
<th>Average Time Per Review</th>
<th>Total Hrs</th>
<th>Potential saving (hrs)</th>
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<td>0</td>
<td>66.7%</td>
<td>1</td>
<td>8</td>
<td>0.75</td>
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</tbody>
</table>

Summary: 946 1025 1023 883 140 3 346 141 23 86% 1.19 6.71 18 7389.7 3097.8

86% 42%
Views and trends from one of the JIP Members (Contractor)

- **Deliver less documents** to Clients
- Are able to **reuse documentation** from previous projects, as concluded from our Client 1 projects (A, B, D, and E) study. Findings described that it is possible to reduce the amount of documentation on future similar projects by 75-80% by reusing existing documentation. Contractor will then only deliver about 20-25% of project documents (calculation is not shown).

- **Reduce the amount of reviews** of document types
  - Client 1 – average 64,5% of documents are issued for review
  - Client 3 – 60% of documents issued for review
  - Client 2 – only 47% of documents issued for review
- With less reviewed documents, the more valuable the review process will be

### Table

<table>
<thead>
<tr>
<th>Client</th>
<th>Project</th>
<th># of Docs</th>
<th># Reviews</th>
<th>Review%</th>
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<td>1597</td>
<td>62%</td>
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<tr>
<td>1</td>
<td>B</td>
<td>199</td>
<td>154</td>
<td>77%</td>
</tr>
<tr>
<td>1</td>
<td>D</td>
<td>345</td>
<td>198</td>
<td>57%</td>
</tr>
<tr>
<td>1</td>
<td>E</td>
<td>655</td>
<td>404</td>
<td>62%</td>
</tr>
<tr>
<td>2</td>
<td>C</td>
<td>2946</td>
<td>1374</td>
<td>47%</td>
</tr>
<tr>
<td>3</td>
<td>F</td>
<td>761</td>
<td>455</td>
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</tr>
<tr>
<td><strong>Average</strong></td>
<td></td>
<td><strong>1250</strong></td>
<td><strong>697</strong></td>
<td><strong>56%</strong></td>
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</table>
LCI Management
Implementing the RP: Potential cost savings to be found across processes and in the entire value chain.

- **Engineering**: Reduce number of hours in review cycles for contractor & operator
  - Increase number of retained (R) documents at supplier
  - Use of generic (G) documents

- **Reduced number of document transactions** between the parties

- **Predictability** from purchasing to delivery
  - Clear document responsibility and identification (System/Assembly-Title-Content)
  - Predictable requirements = Predictable delivery

- **Document production efficiency gains**
  - Re-use documentation across projects (and contractors) and through the supply chain = Generic documents (G)
  - Clear ownership

---

PSA: Z-001/Z-018 – audit basis will be unchanged

- **Regulatory context**
  - Authorities
  - HSE
  - See-to duty

- **Project execution & Ops**
  - Procurement
  - Engineering
  - Document control
  - Verification philosophy
  - Operations
  - Modifications

- **Contractor collaboration**
  - LCI requirements
  - Technical specifications
  - Document production
  - Delivery method

- **LCI processes**
  - LCI strategy
  - Project LCI plans
  - LCI requirements
  - LCI/DM systems
  - LCI management

---

RP-O101
Summary
Summary for standardization

- Company standards (procedures) have a positive effect on businesses because they help *improve internal processes*

- When it comes to relationships between suppliers and customers, industry-wide standards are the main instruments used to *lower transaction costs*

- Standardisation creates *predictability* throughout the supply chain

- Standardisation enables *flexibility* to custom making

- The cost battle cannot be won by initiatives enforced to one party only! *The entire supply chain has to contribute* (Operators, System suppliers, Suppliers)
Sound oil & gas activities at lower oil prices

Building trust in the value chain

COLLABORATION

STANDARDIZATION

INNOVATION

COMMITMENT
Welcome to join the JIP Subsea Doc. Implementation 2016

Project Manager, Bente Helen Leinum
Bente.Leinum@dnvgl.com
+47 419 07 649

For more information: Standardised subsea documentation JIP - DNV GL

www.dnvgl.com

SAFER, SMARTER, GREENER