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Towards Systemic Handling of Requirements in the Oil and Gas Industry – a Case Study

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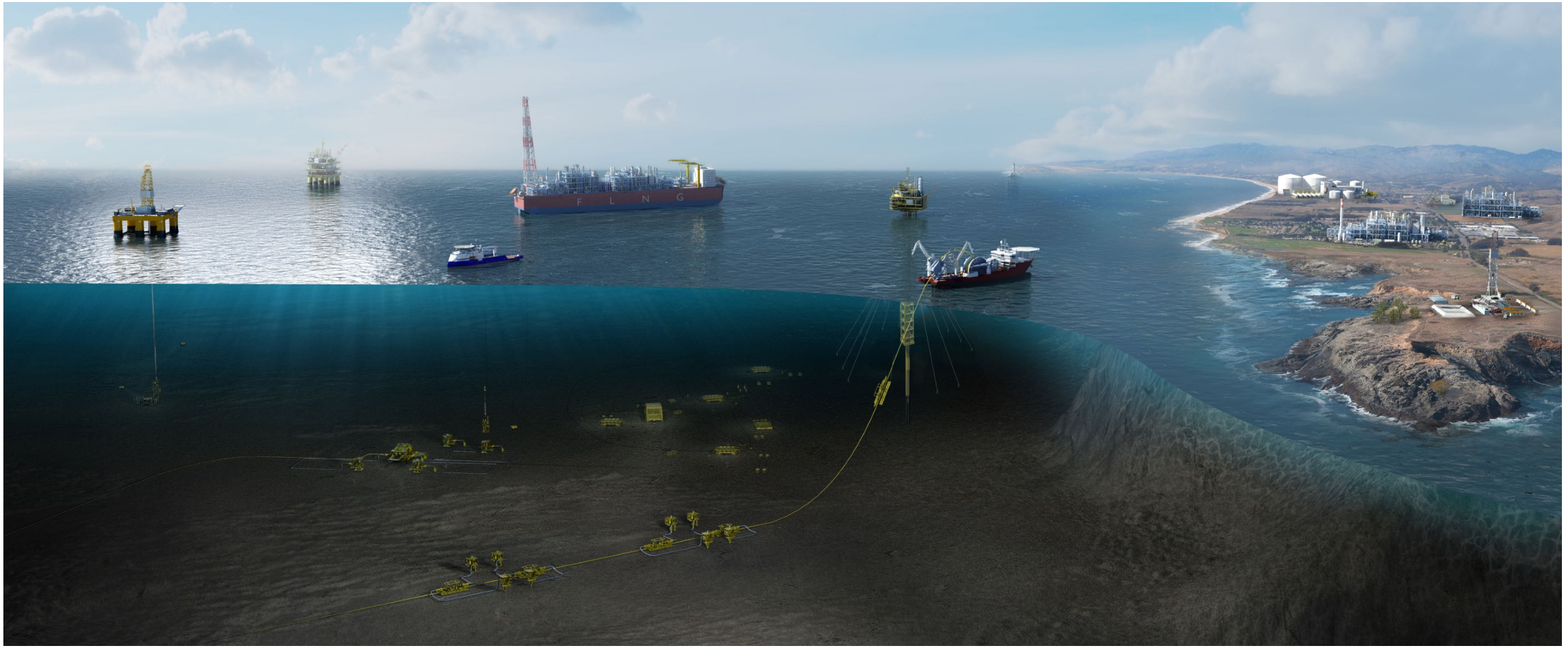
Towards Systemic Handling of Requirements in the Oil and Gas Industry – a Case Study

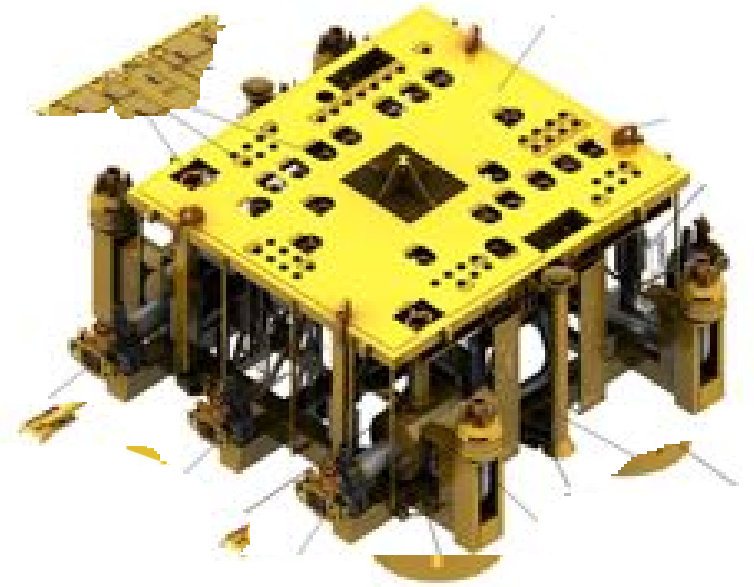
- Background/Context
- Research
- Case Study
- Conclusions

Subsea field layout



Subsea systems

Manifold

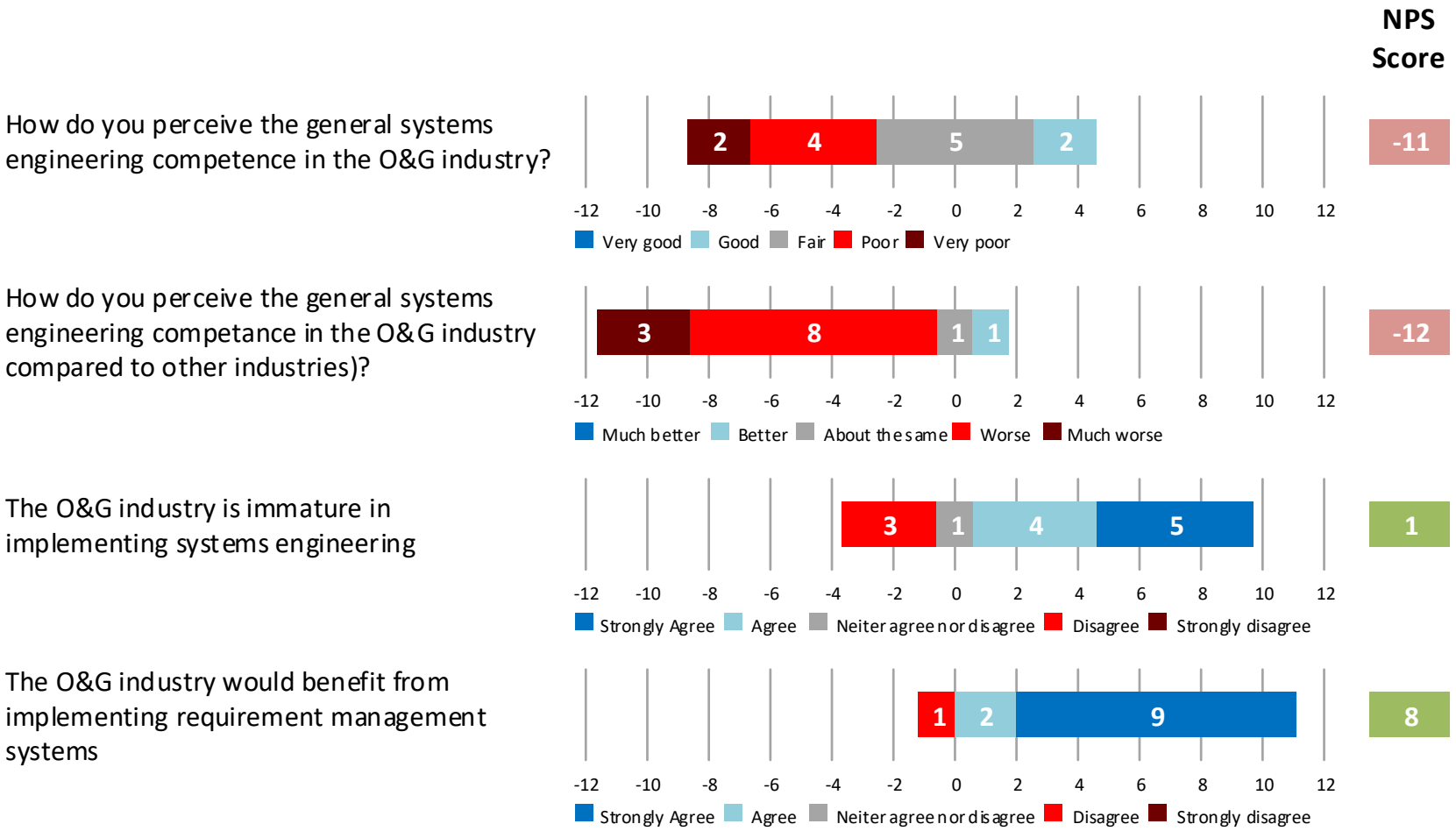


Pressure monitoring
interface to well

Research questions

- What is the maturity of requirement management in the industry?
- What are the benefits and challenges from implementation of requirement management systems in a supplier company?

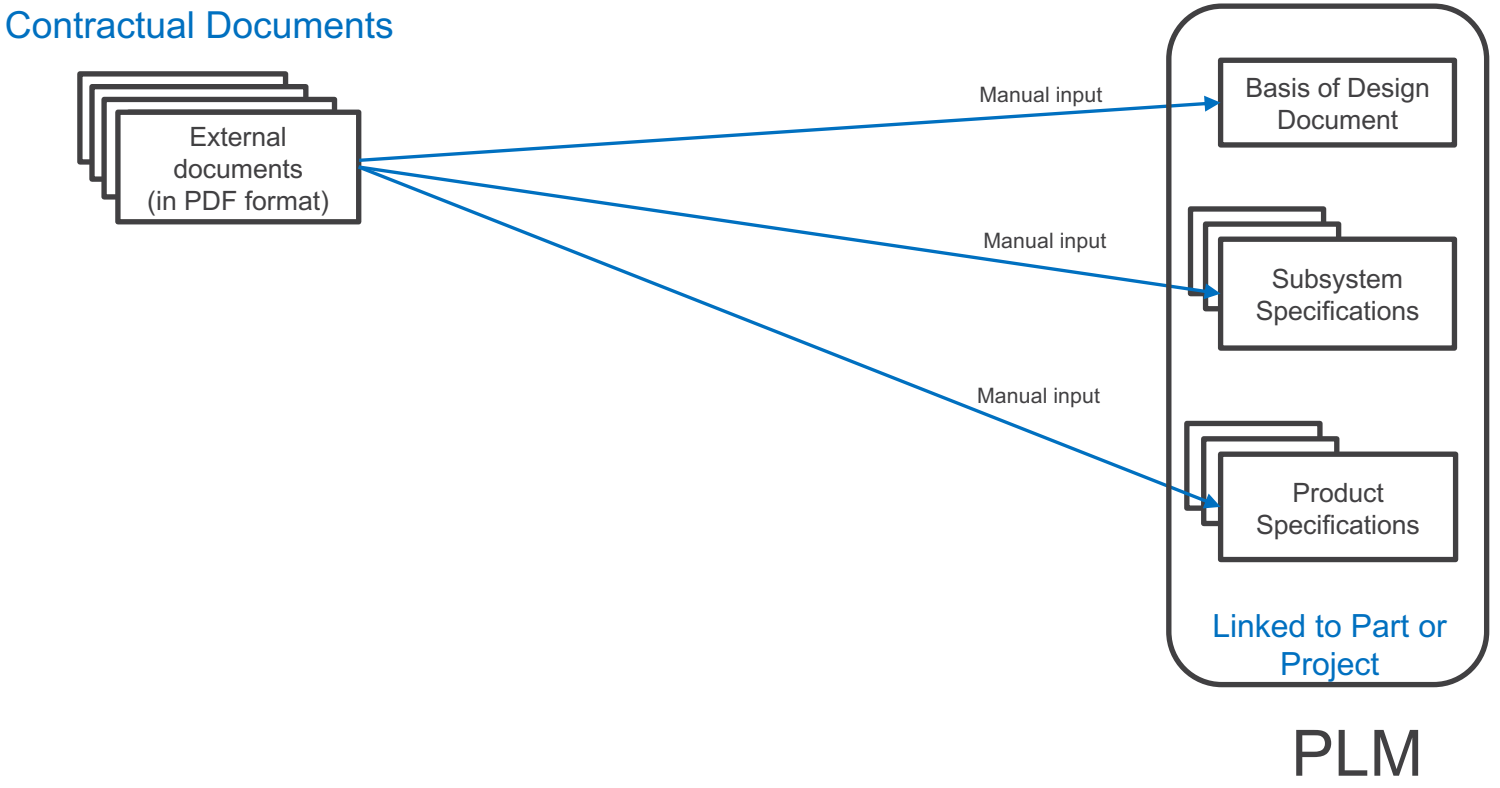
Research management in the industry



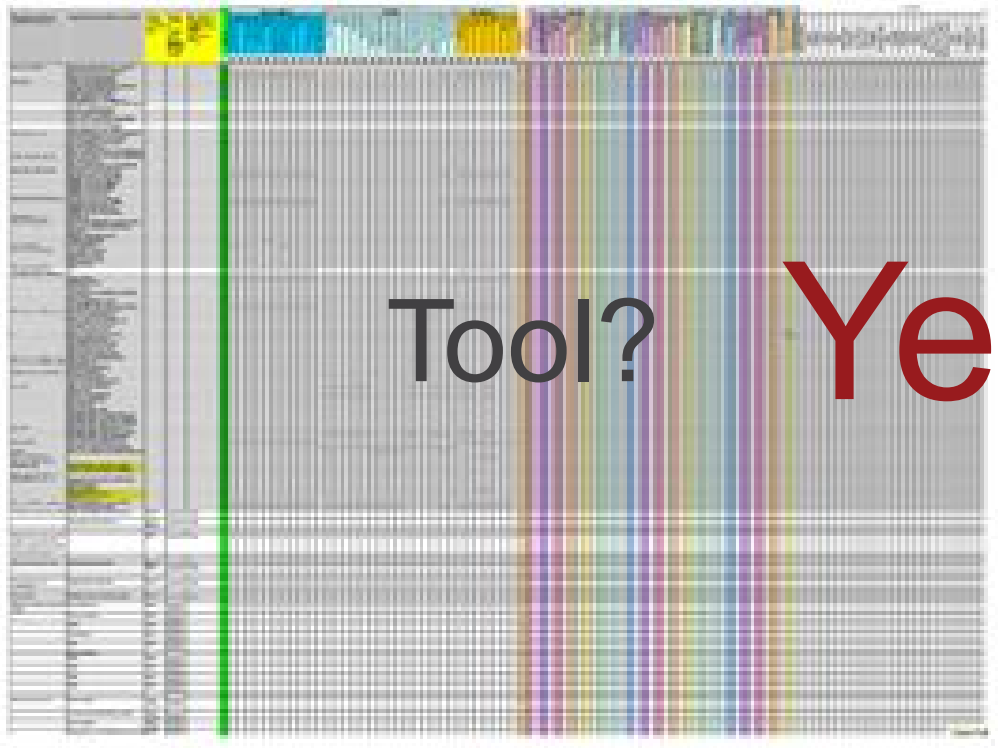
Typical number of requirements specifications

Customer	Project type	Standards	Customer specifications	Governmental specifications	Type of Customer	Total number of specifications	Year started
B	Large	0	24	6	Large	30	1991
B	Large	23	33	6	Large	62	2007
C	Large	22	235	0	Large	257	2011
B	Medium	21	49	6	Large	76	2011
F	Large	70	119	0	Large	189	2012
A	Medium	75	112	4	Small	191	2014
B	Large	11	57	4	Large	72	2015
D	Medium	69	64	6	Small	139	2017
B	Large	15	93	4	Large	112	2018
B	Large	9	45	4	Large	58	2019
E	Large	61	39	6	Small	106	2019

The traditional way of partitioning Customer specifications



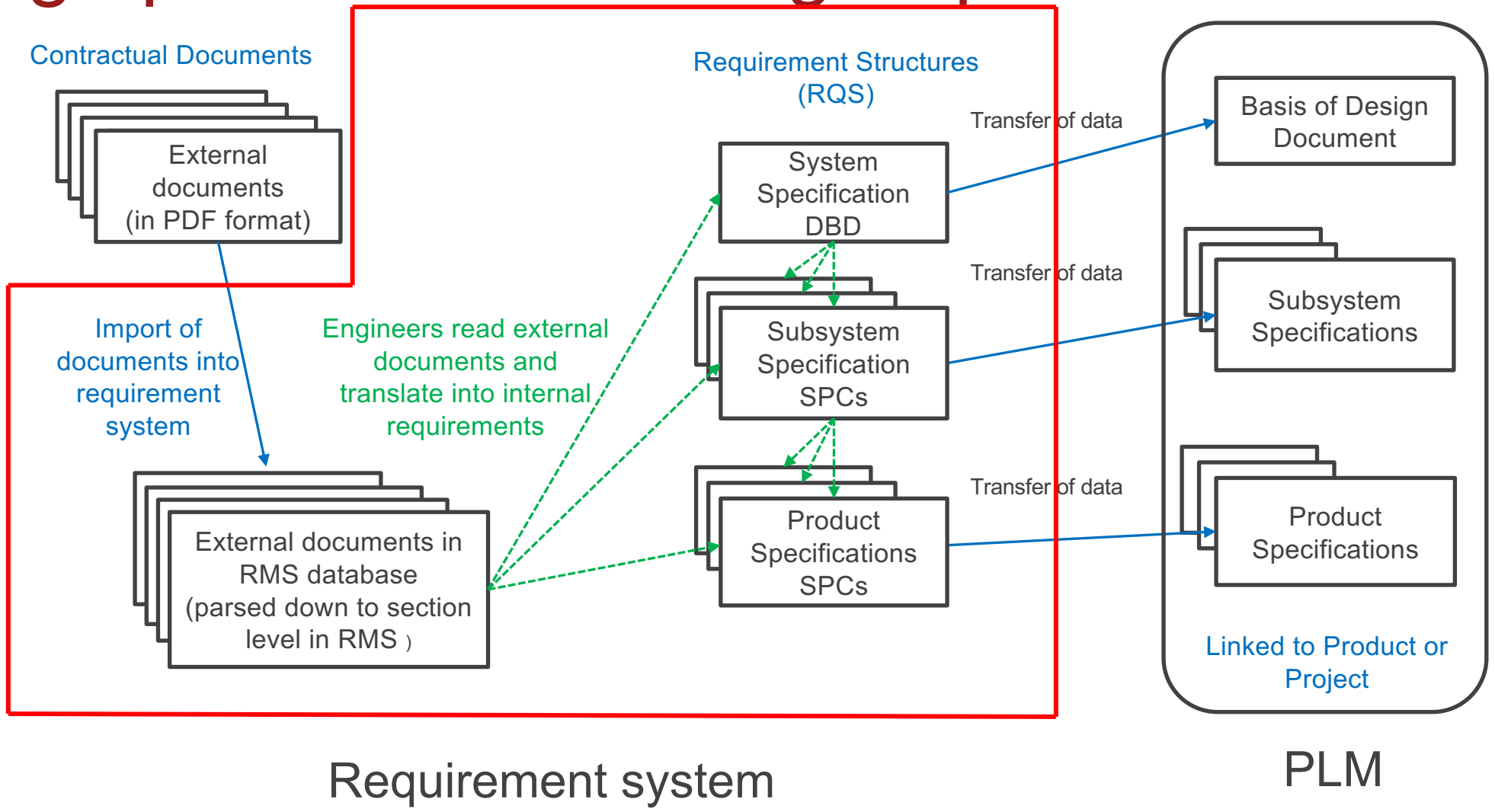
History…



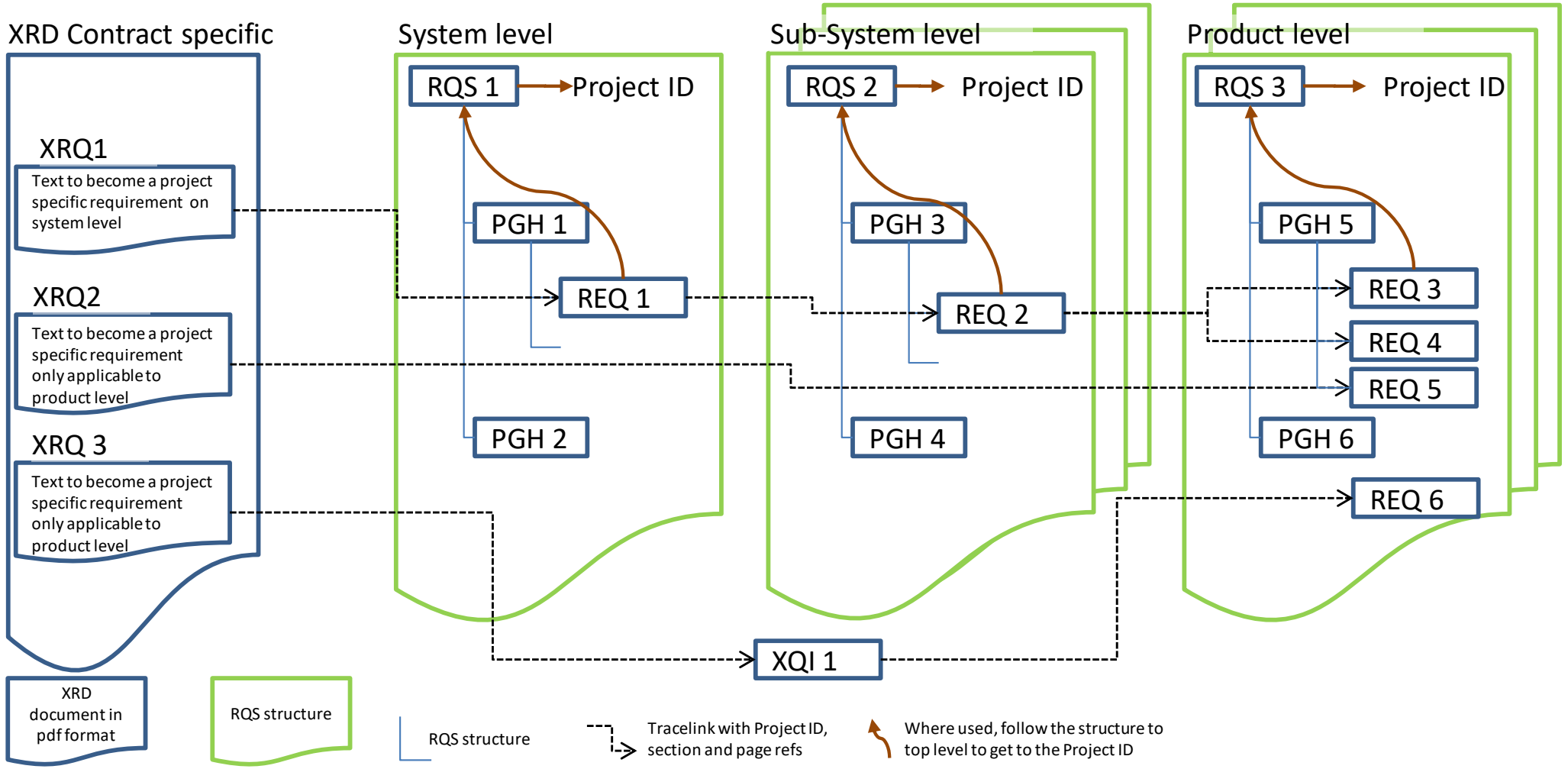
Discussions…

- How shall the layout of the output report/document from the tool look like (the tool is a database)?
- Shall the requirements ID be shown on the layout?
- What about the size and the layout of the traceability information?
- How to handle and show revision control of the requirement itself ?

The «big» picture for handling requirements today



Flowdown and relationship



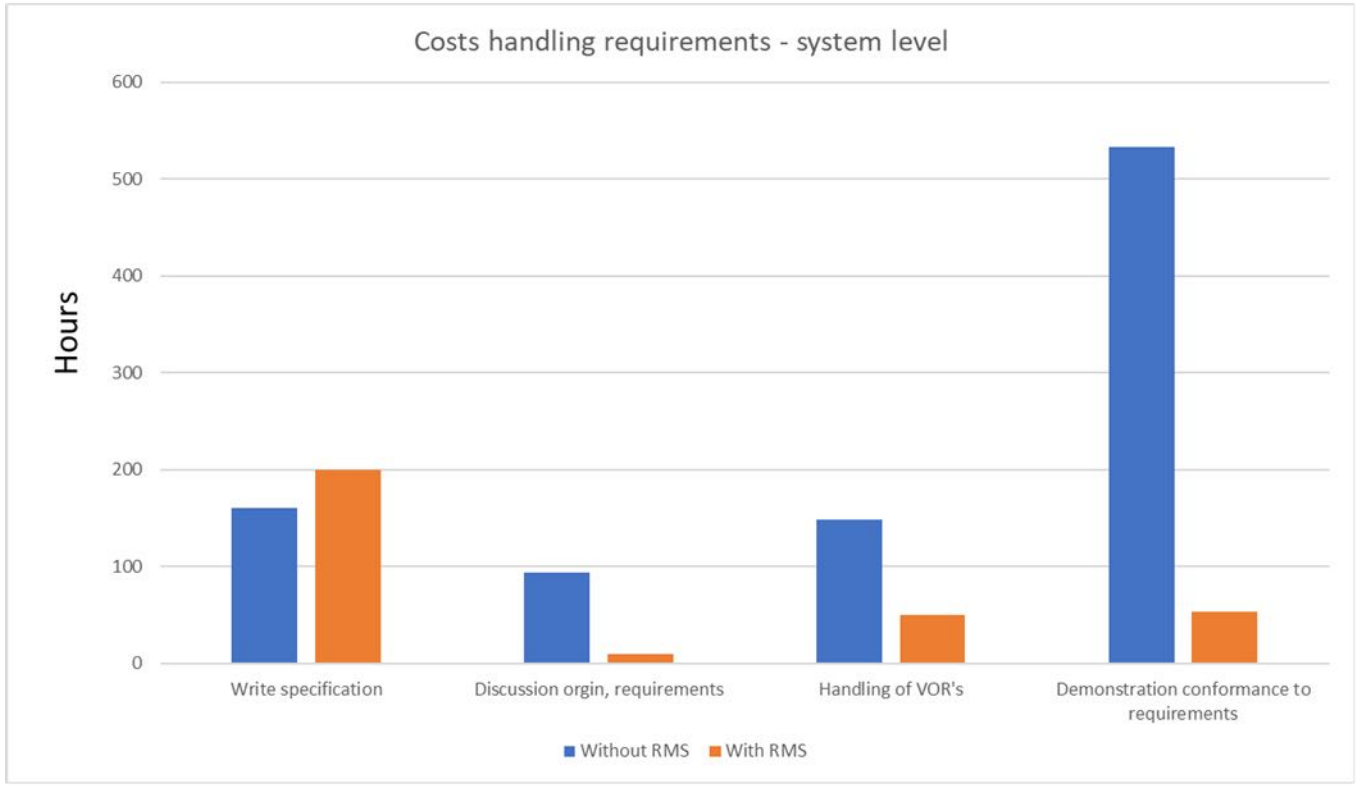
Status implementation today

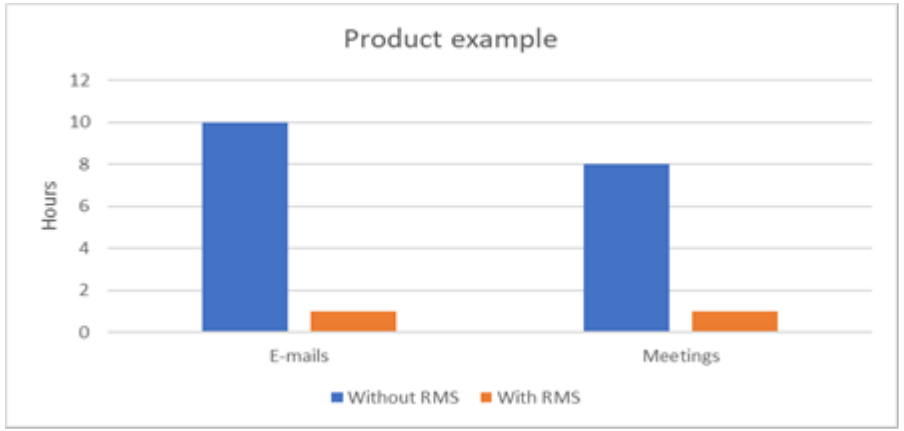
	System DBD	Safety	Sub-system 1	Sub-system 2	Sub-system 3	Sub-system 4	Sub-system 5	Product 1	Product 2	Product 3	Product 4	Product 5
Project 1												
Project 2	x		x		x	x		x				
Project 3	x						x					
Project 4	x		x									
Project 5	x											
Project 6	x											
Project 7	x		x		x	x	x	x		x	x	
Project 8	x											
Project 9	x	x	x	x	x	incl in DBD		x		x	x	x
Project 10	x											
Project 11	x				X							
Project 12	x	x				x				x		
Project 13	x		x		x	x						

Implementation experience

- Timing between study and execution is very short,
  - Not able to start early enough to capture the requirements into the tool
- Mindset for new way of working is challenging
  - It's a new tool
- It is a more rigid working process than using «Word»
- Writing requirements specifications in "prose" is perceived as easier
- Implementing a new way of working in a huge organization in a mature industry is not straight forward

Result case study





Conclusion

The maturity of requirement management in the industry:

- The survey showed:
  - The systems engineering competency in the industry is perceived as poor, and worse than in industries with comparable system complexity
  - The lack of systems engineering competence and culture are amongst the factors challenging the implementation systematic requirements handling
  - The industry would benefit from implementing systems engineering methods, and in particular implementing requirement engineering management

The case study from the supplier company shows clear benefits of implementing a requirement management system:

- Main benefit from the implementation at the Supplier:
  - Provides a systematic handling of requirements that improves traceability, consistency and ensures quality of the origin of the requirement
  - Saves the resources time in searching for information during project execution
  - Experience also supports identification of conflicting requirements

Implementation of new tool in an organization is challenging

- Resources are skeptic to new tools
- Perceive the use of tools more rigid and time consuming
- Benefits of the implementation are more visible on a company level than on a personal level

Future – next steps

- Continue our implementation
- Enabling verification and validation (V&V)
- Requirement management as the starting point for the digital thread
- Collaborate and encourage the industry to provide digitalized external specifications
- Exceptions and Clarifications (E&C)
- Study: “How to do requirements machine readable, automate allocation, support configuration management” using for example the RDS(reference designation system) a classification system to be defined in a ISO81346-X for the Oil&Gas industry (https://readi-jip.org/)

Q&A

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