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Applying A3AO to facilitate future working processes in the Oil and Gas Industry

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Applying A3AO to facilitate future working processes in the Oil and Gas Industry

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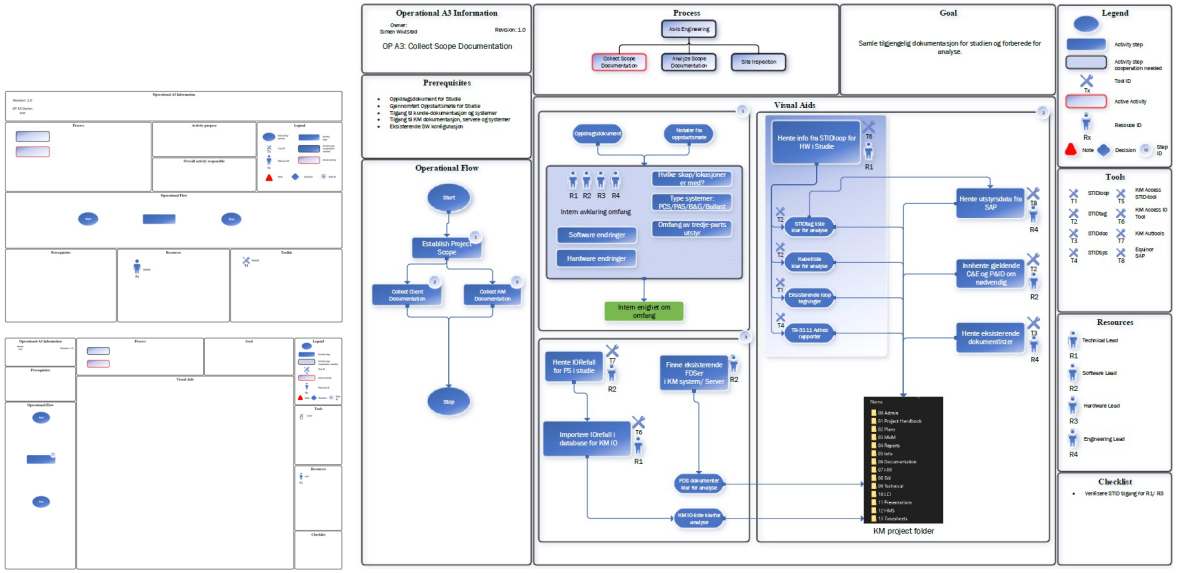


Agenda

INTRODUCTION

LITERATURE

CONCEPT: OPERATIONAL A3

RESEARCH METHODOLOGY

CASE STUDY FINDINGS

WORKSHOP TESTING

EVALUATION

Introduction

- New production facilities - Greenfield projects
- Low oil price
- Existing prodcuction facilitites - Brownfield Upgrade projects
- EPCI projects
- Need for increased efficiency and quality

Line of Reasoning

Symptoms	Problem	Goal
Key-personnel dependency	Lacking a tool to architect working processes	Lacking a tool to architect working processes
Less experienced engineers' understanding As-Is Engineering phase		
No prioritization on documenting working processes & best practices		

Research Question

- ***How to develop a process architecting tool to facilitate future As-Is Engineering working processes for increased performance in Brownfield Upgrade projects?***

Literature

Processes

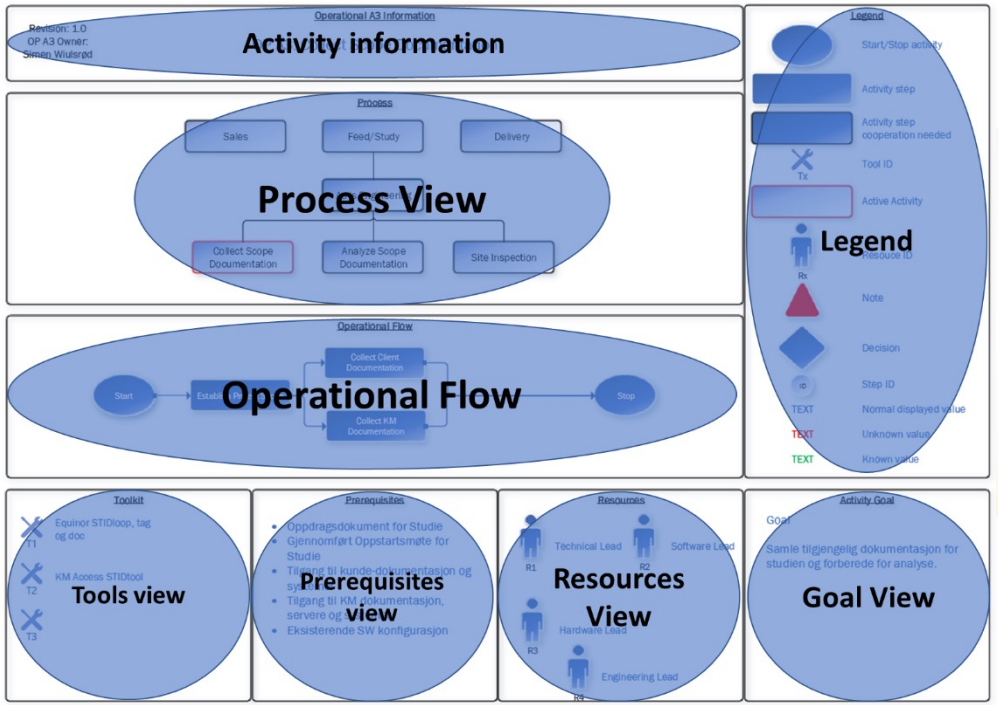
- *”an activity which takes place over time and which has a precise aim regarding the results to be achieved”*
- Core compentency
- Value creation
- Process mapping
  - Effective visual communication of information
  - Actions, activity steps, people involved, inputs/outputs
  - High-level process maps, document map, value stream map, detailed process map, workflow diagram, swim lane map

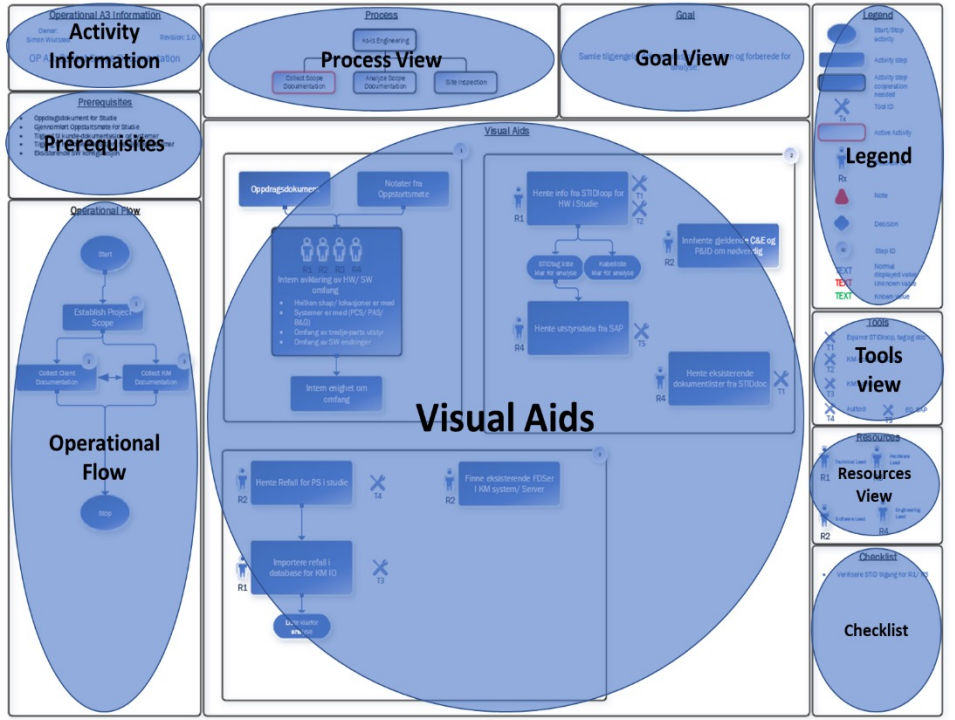
A3AO

- A3AO: Facilitate effective communication – Combination of text, pictures, diagrams and charts to describe a system of interest
- Prevents “Information Overload”
- Human friendly
- System Architecture
- Process Architecting

Literature – Why I chose A3AO

“If a company has a need to architect a process or simply unify their way of working, it is recommended to use A3AOs to communicate this architectural knowledge in the complex systems development process.”-Johanssen and Zhao (2019)





Operational A3

Research Methodology

CASE STUDY

OPEN INTERVIEWS

SEMI-STRUCUTRED INTERVIEWS

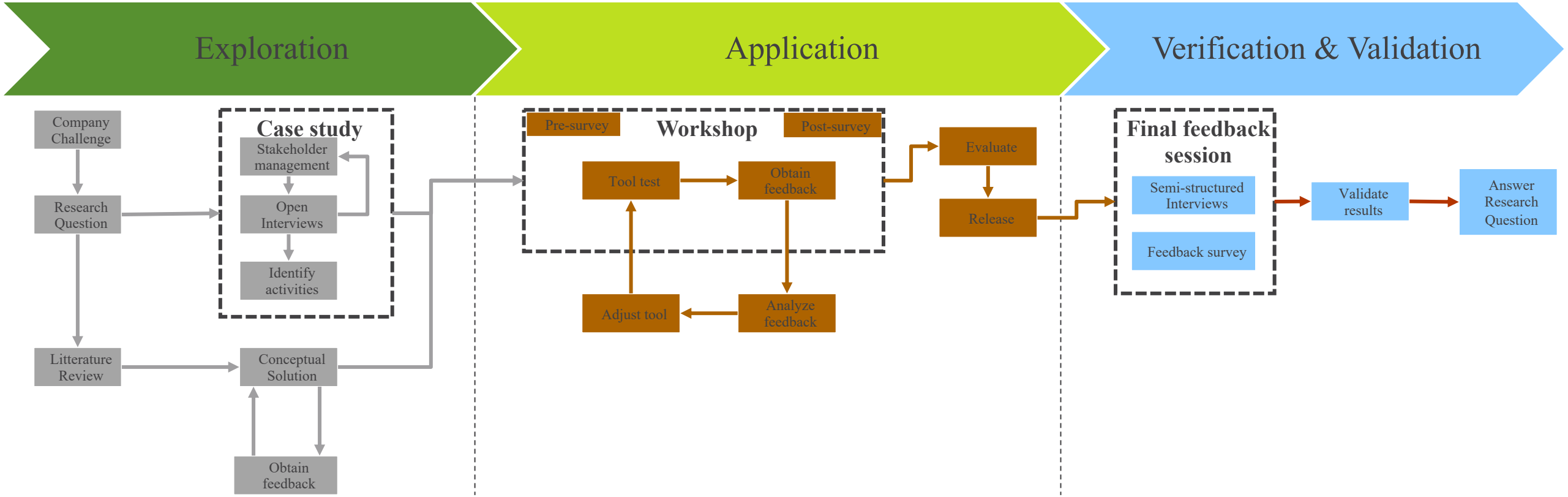
WORKSHOP TESTING

SURVEYS

Interviews with stakeholders

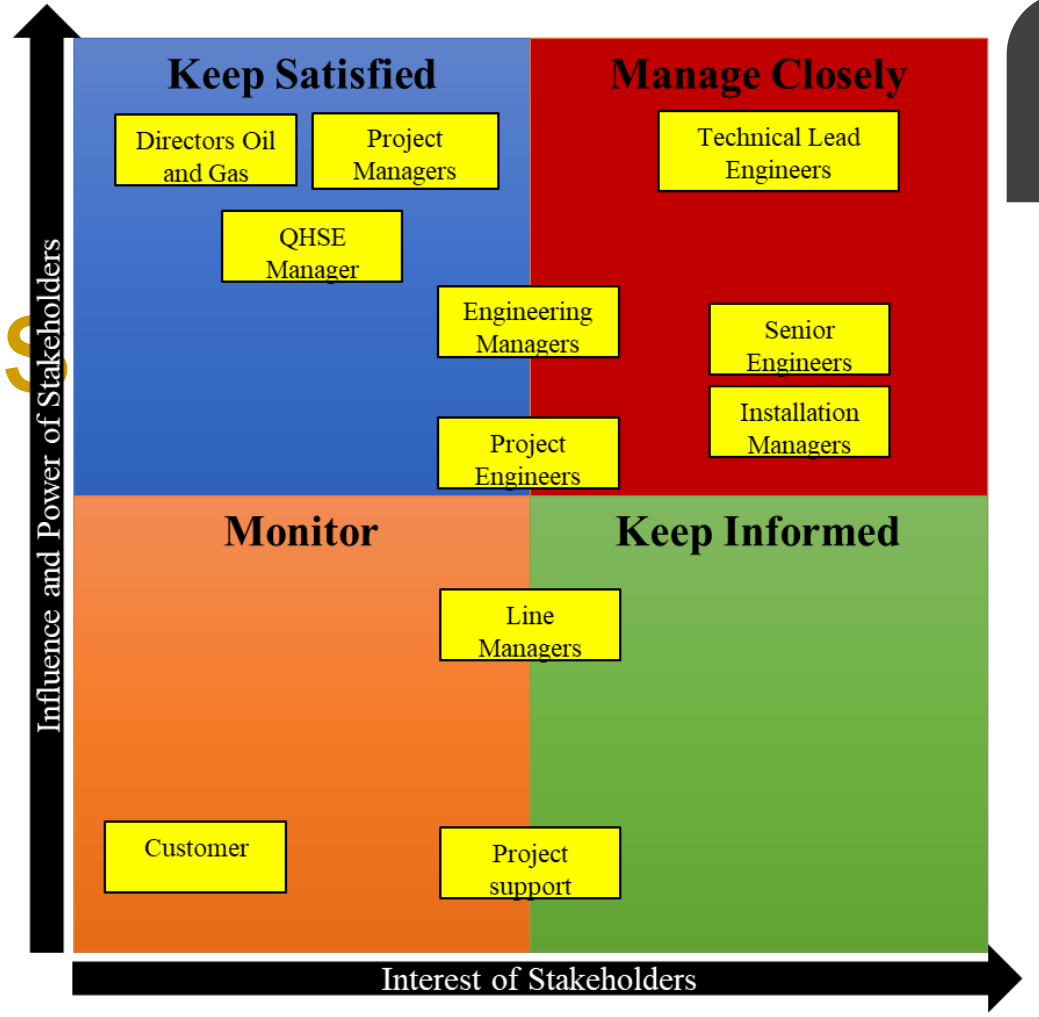
No.	Type	Participant(s)	Experience	Objective	Phase
OI-1	Open Interview	1 Line Manager, 1 Installation Manager, 1 Engineering Manager	50+ years	Explore problem and relevant stakeholders for case study	Exploration
OI-2	Open Interview	2 Technical Leads, 2 Senior Engineers, 1 Project Engineer	80+ years	Case study exploration	Exploration
OI-3	Open Interview	1 Engineering Manager, 1 Line Manager	40+ years	Concept exploration	Exploration
OI-4	Open Interview	2 Directors	40+ years	Concept feedback	Exploration
SSI-1	Semi-Structured Interview	2 Directors, 1 Line Manager	40+ years	Concept feedback based on created OPA3s	Application
SSI-2	Semi-Structured Interview	1 Line Manager	30+ years	OPA3 concept feedback	Verification & Validation
SSI-3	Semi-Structured Interview	1 Project Manager	20+ years	OPA3 concept feedback	Verification & Validation
SSI-4	Semi-Structured Interview	1 Senior Engineer	10+ years	OPA3 concept feedback	Verification & Validation
SSI-5	Semi-Structured Interview	1 QHSE Manager	30+ years	OPA3 concept feedback	Verification & Validation

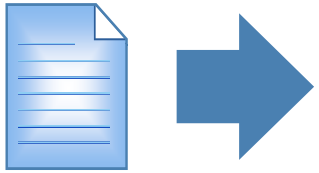
Research Design



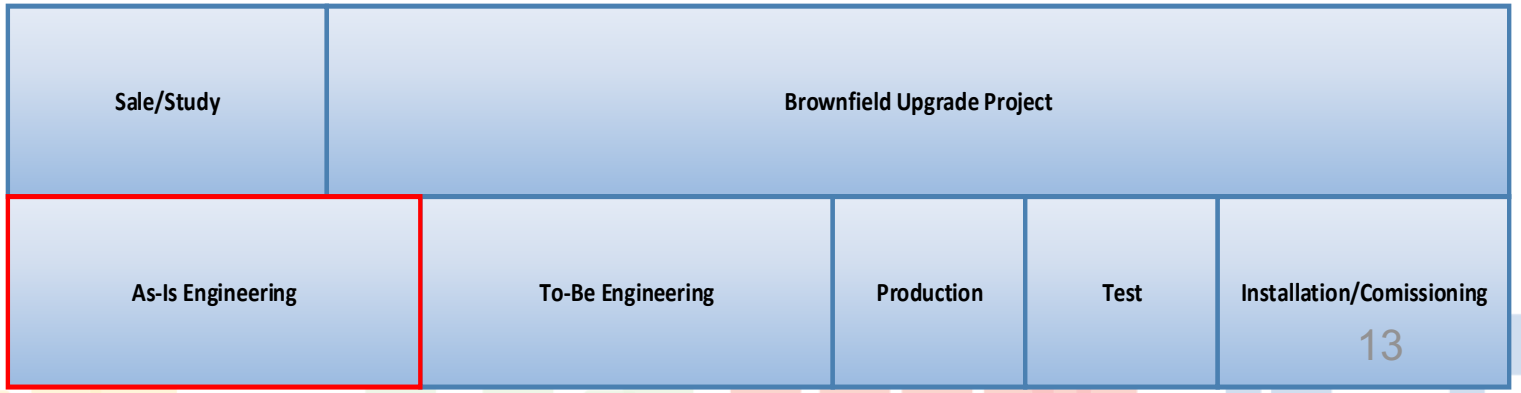
Case study findings

- Brownfield Upgrade projects
- OPA3 level of abstraction
- As-Is Engineering
  - Collect Scope Documentation
  - Analyze Scope Documentation
  - Site Inspection





Customer:
Mission document



Engineering activities & Workshop

1. Collect Scope Documentation

- to gather all available documentation for the scope of work and prepare for analysis.

2. Analyze Scope Documentation

-to verify correct existing documentation, list up deviations and propose conceptual solutions to fulfill customer need and requirements stated in the mission document.

3. Site Inspection

-to get a more detailed overview of the As-Is situation on board the vessel or platform being upgraded

Workshop 1

Workshop 2

Workshop 3

Workshop testing

The visualization aspect makes me think!

Workshop 1:

Collect Scope Documentation

One Techincal Lead Engineer

I like how the tool forces us to visualize how we work rather than describing it with text.

Workshop 2:

Analyze Scope Documentation

One Techincal Lead Engineer, one Installation Manager and one Senior Engineer

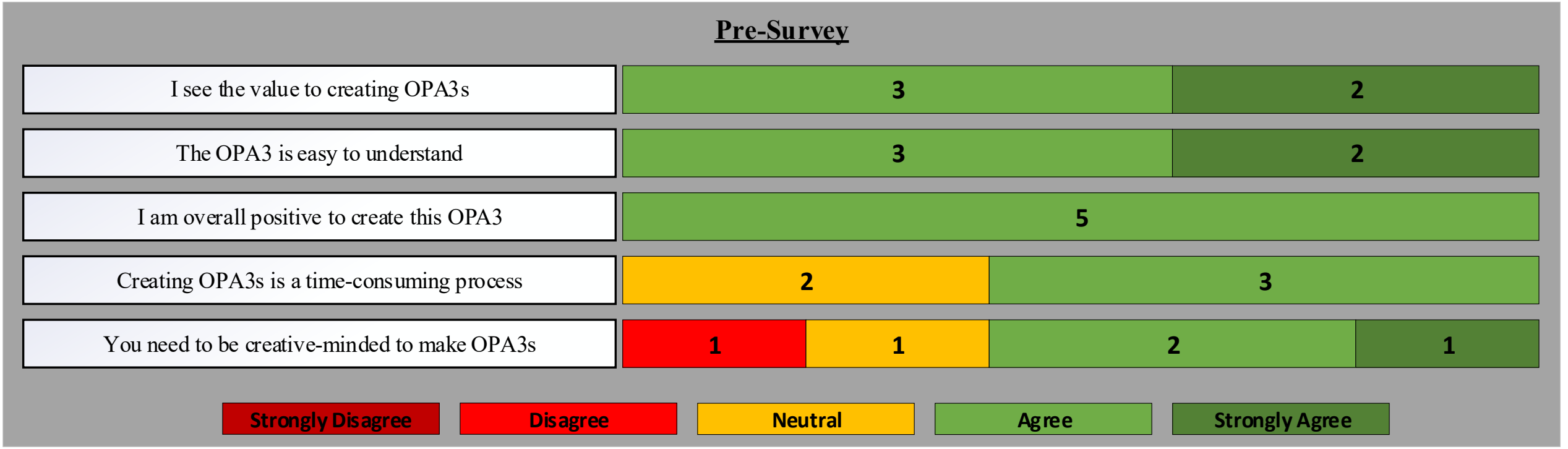
I would rather read this as a new engineer than text documents

Workshop 3:

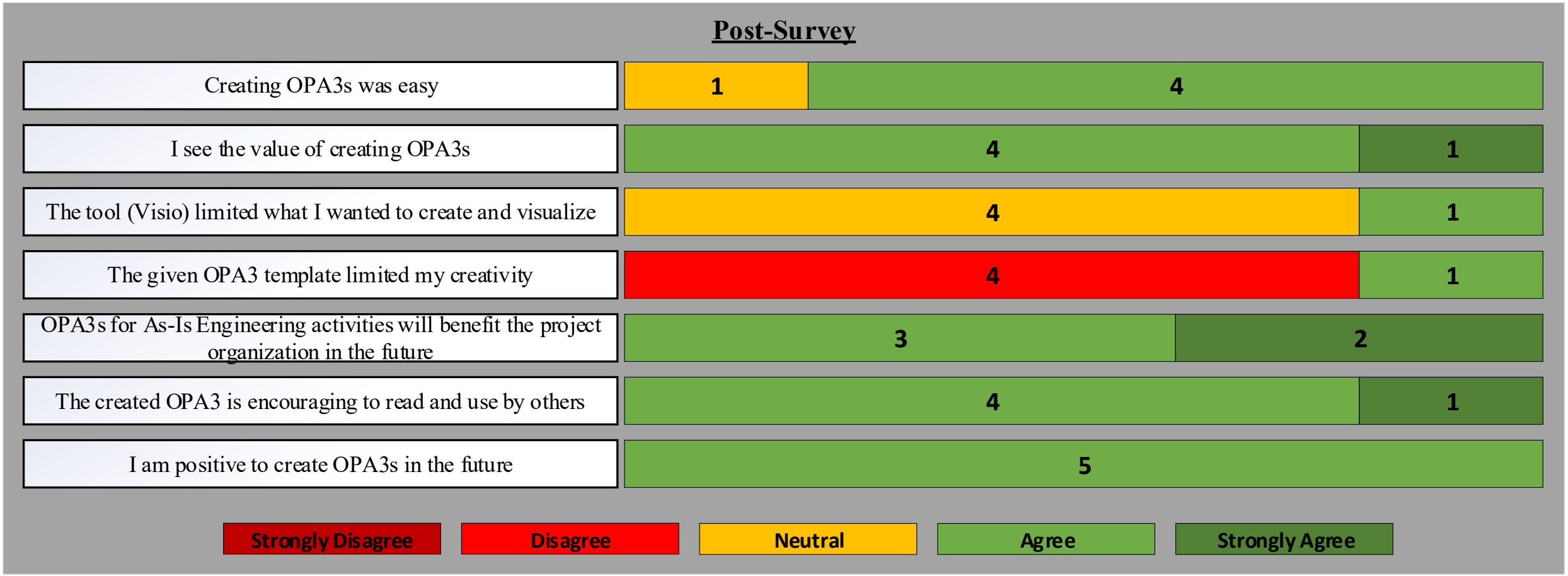
Site Inspection

One Project Engineer

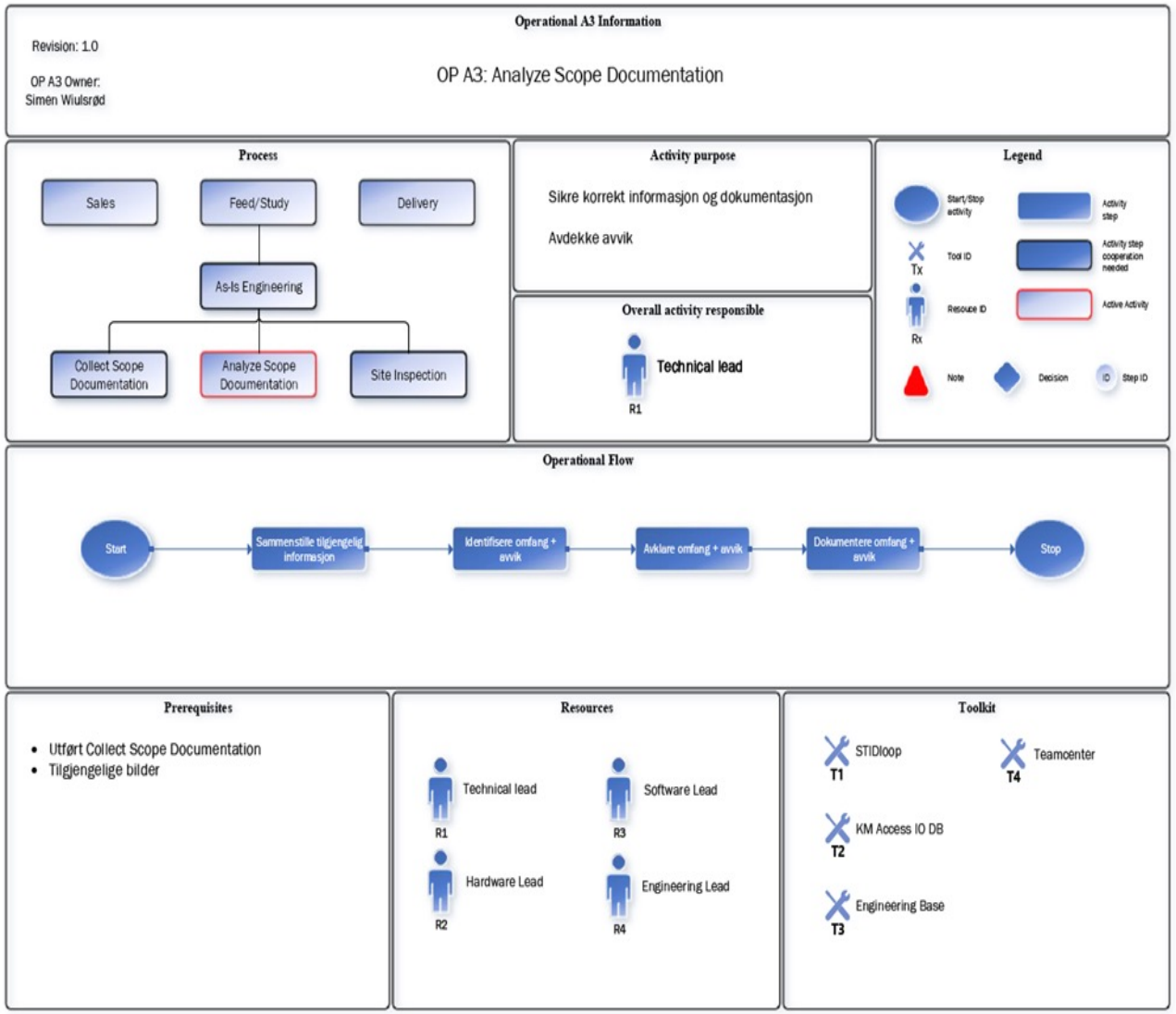
Workshop testing, Pre-survey

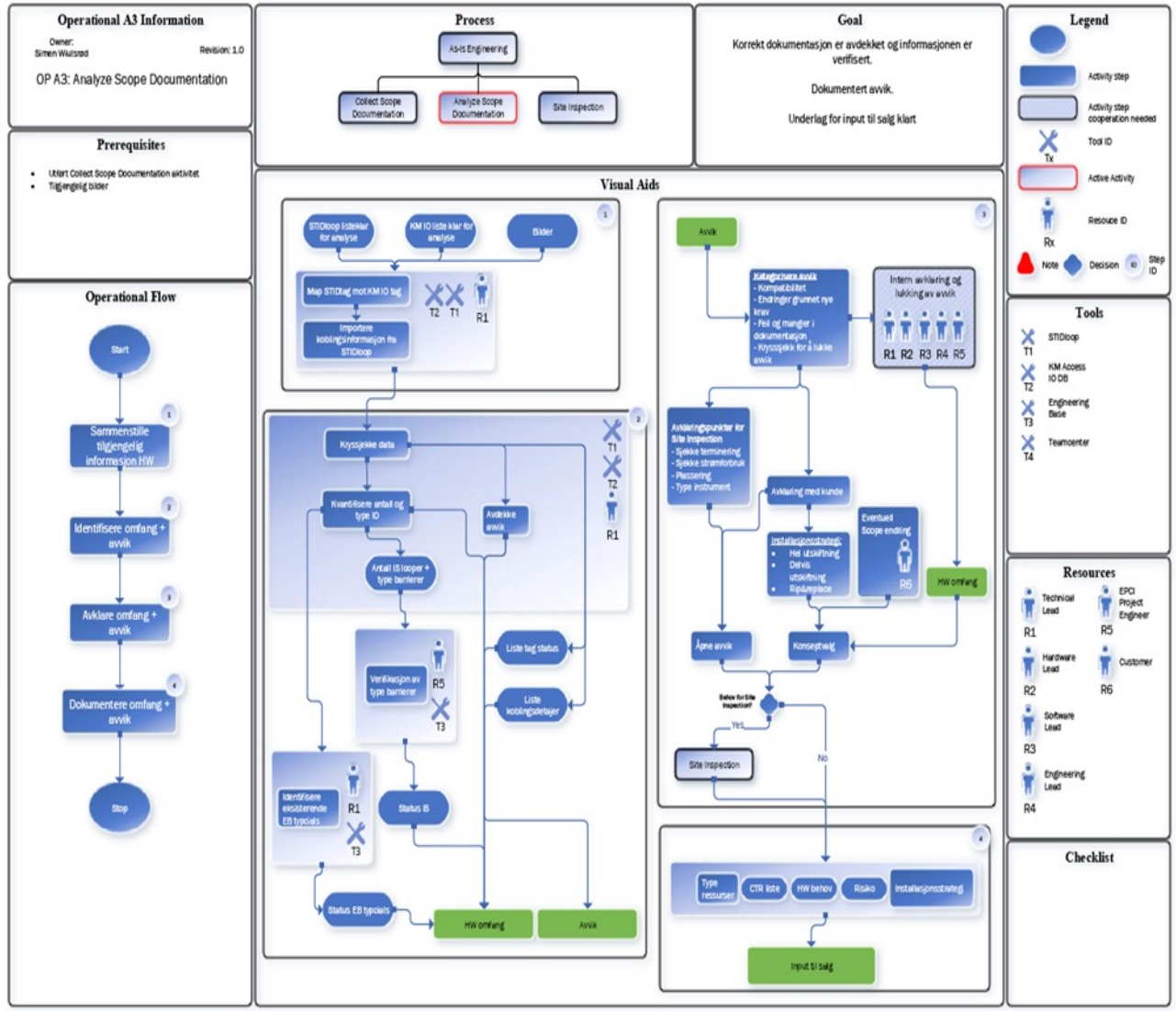


Workshop testing, Post-survey



Final solution

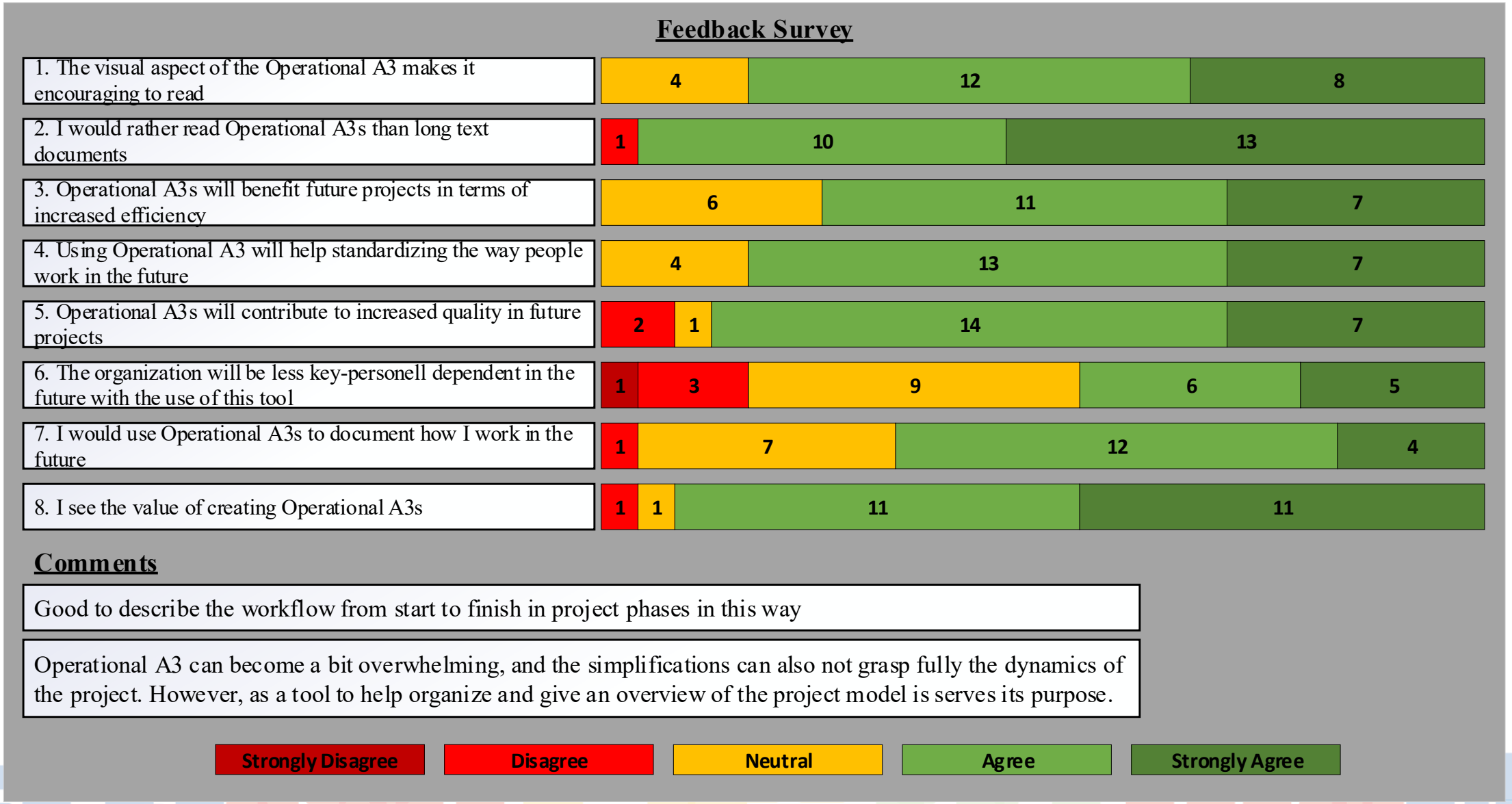




Evaluation – Semi structured interviews

Text documentation versus Operational A3	*"I think it is easier to get people to look at this rather than reading a long document. Here you have two A3 pages giving the full overview. This activity you are showing here would easily be 20 pages of guideline documentation in comparison."* - ***Director Oil and Gas***
Performance attributes in future projects	*"I believe we could reduce the amount of engineering hours if such OPA3s are made for different engineering activities. We can secure conformity in the projects, which will end up in better quality in the end."* – **Project Manager**
The visual aspect of the Operational A3	*"We are developing towards a more graphical future with the newcomers use of social media, apps and others. I believe this could catch new engineers' attention and be a platform for architecting process documentation for the new generation."* - **Line Manager**
Key-personnel dependency	*"It depends on the level of detail and how you are using your keyperson. If you are using your keyperson for a step-by-step process the OPA3 will reduce the keyperson dependency. If you are using the keyperson for detailed knowledge, the OPA3 will not help."* – ***Quality Manager***

Evaluation – Feedback survey

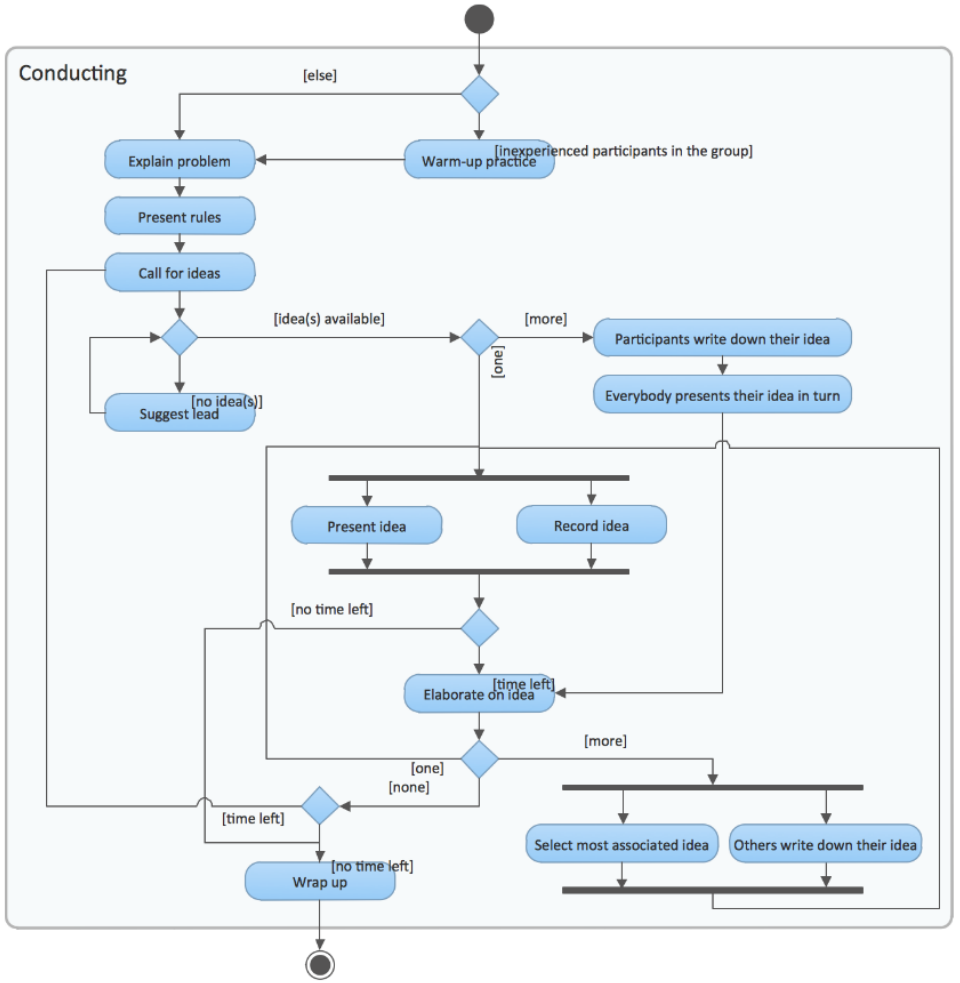


Can we trust the results?

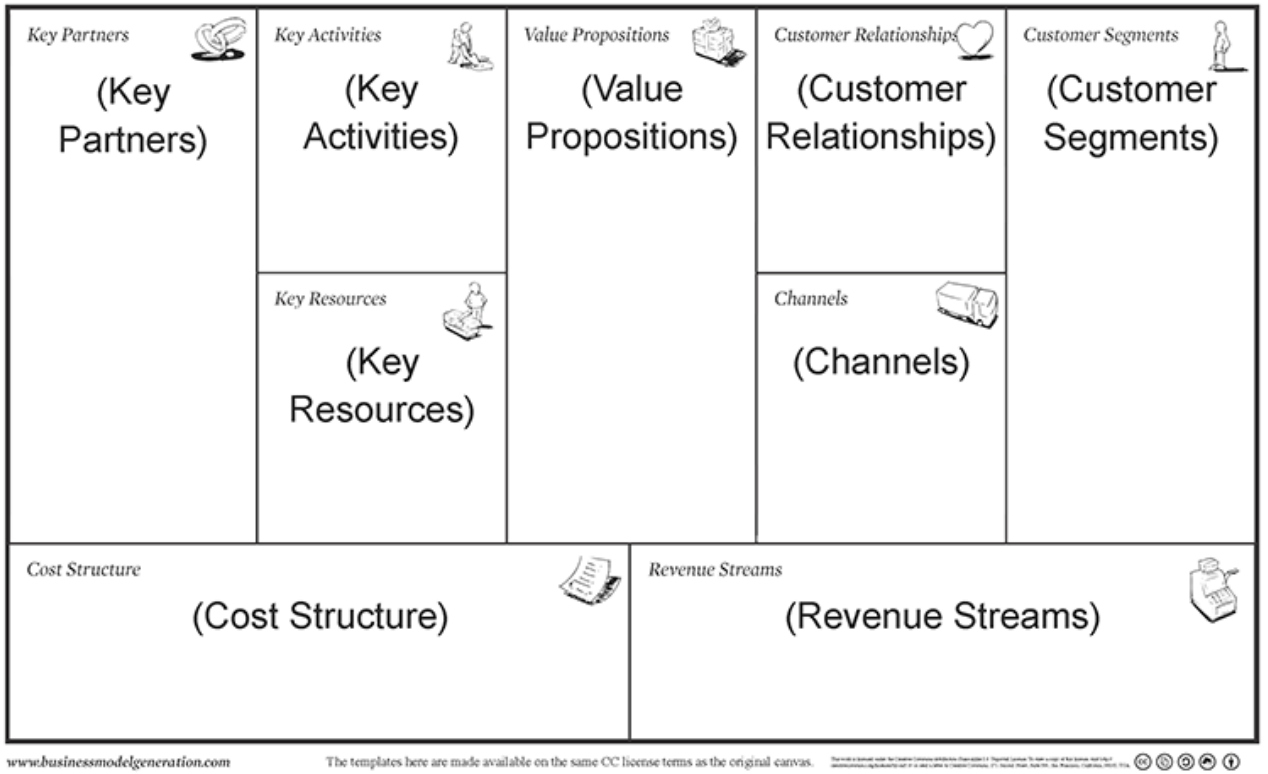
Conclusion

- This research applied the systems engineering method to develop a process architecting tool that facilitates As-Is Engineering processes for increased performance in future projects.
- The optimized version of the process architecting tool - OPA3 is validated and verified in terms of efficiency and quality in future projects in the case study.
- By adopting OPA3, we found 1) experienced engineers can visualize how they work and communicate this knowledge to less experienced engineers; 2) instead of replacement of a key-person in a project, the OPA3 should be a great addition to less experienced engineers for improved work performance through visual learnings.

Extra: Another SE method to solve the same problem?



- Business Process Modelling using UML
- Business model canvas



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