Exploratory Projects in Manufacturing Industry: A Longitudinal Case Study

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The Research Hypothesis

The traditional manufacturing organisation efficiently performs well-defined development projects where the requirements are known at the project initiation.

Such organisation struggles in performing exploratory projects where neither goal nor implementation methods are elaborated.

Research Question

MRQ: How does the traditional manufacturing organisation manage exploratory projects in the area of the unknown?

SQ1: What were the positive experiences in the organisation performing exploratory projects?

SQ2: What were the negative experiences in the organisation performing exploratory projects?

SQ3: What are practical recommendations and theoretical contributions from this study?

Method

1. Organisational form

- Program / Project / Task

2. Complexity

- Low / Mid / High

3. Unknown-unknowns estimation*

- Estimation (*adapted from (Crawford and Pollack 2004))

4. Organisational support

- Top management
- Mid management
- Team members

5. Results and knowledge gained

- Technical
- Business
- Organisational
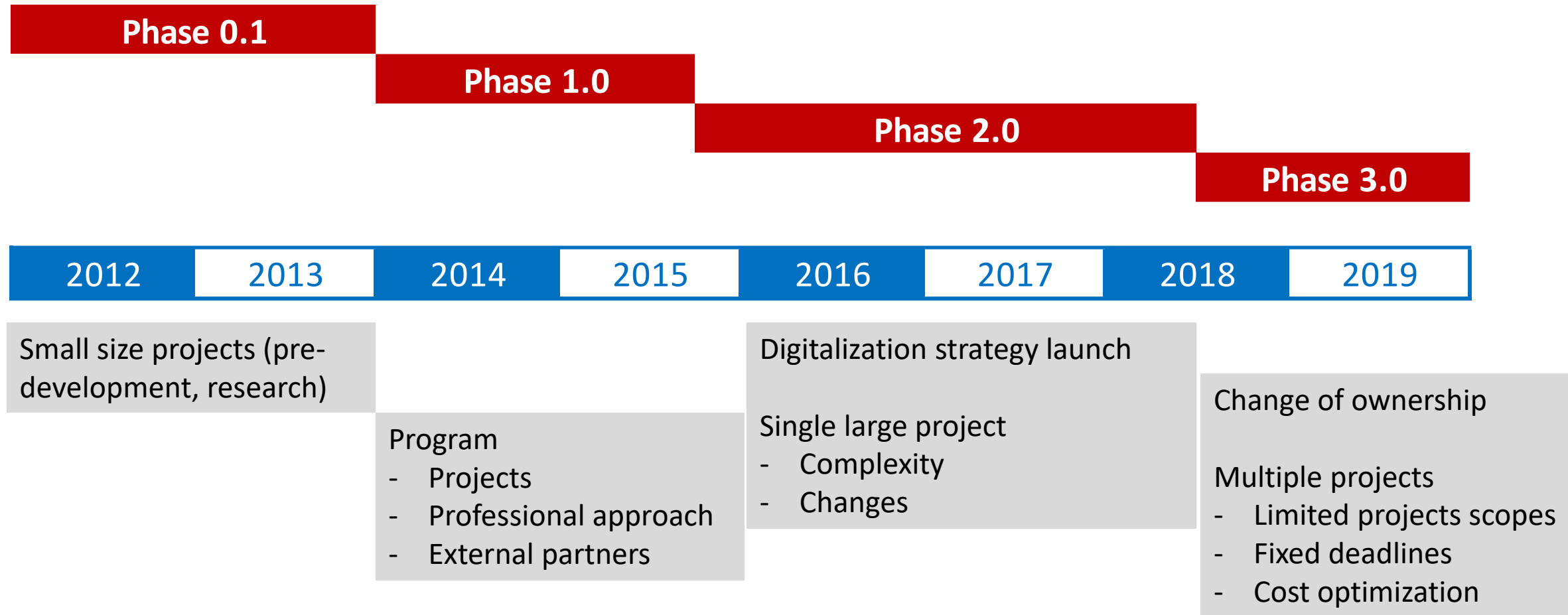
6. Known-unknowns estimation

- Estimation

We constructed a new **uncertainty framework** for
- capturing,
- analysing, and
- comparing

the indicative characteristics of the observed projects.

Observation Period

Phase 0.1							
Phase 1.0							
Phase 2.0							
Phase 3.0							

| 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |

Small size projects (pre-development, research)

Program
- Projects
- Professional approach
- External partners

Digitalization strategy launch

Single large project
- Complexity
- Changes

Change of ownership

Multiple projects
- Limited projects scopes
- Fixed deadlines
- Cost optimization

Research Question

- The Company built knowledge and competencies and organised three dedicated departments with experts to develop products, and ICT and business solutions.
- Some new business processes have been implemented.
- The Company can use these capabilities for future projects in this field.
- Despite challenging project setup, some excellent project results can be attributed to high commitment, shared leadership and adequate knowledge of some participants.
- The results have been presented at international trade fairs, launched to the market, and published in professional publications.

SQ1: What were the positive experiences in the organisation performing exploratory projects?

Research Question

- The Company's top management did not understand the level of uncertainty in these exploratory projects.
- Expectations were too high.
- Some project managers, appointed by the managing board, did not perform.
- Other project managers and core team members had difficulties convincing the stakeholders that these projects focus on learning rather than short-term tangible results.
- Project managers have failed to more resolutely oppose unrealistic demands to increase the scope of the projects without additional resources and additional time.

SQ2: What were the negative experiences in the organisation performing exploratory projects?

Research Question

- In case of new business, technological, organisational, or any new (inovative) ideas, the Company must allow sufficient time and resources to execute some exploratory projects.
- These projects are necessary for organisations, in general, to create a solid knowledge base before using this knowledge and capabilities in strategically important projects.
- The Company must improve its culture so that the project managers become recognised experts parallel to other experts.
- The Company has to implement or improve project-oriented organisational forms (Huemann 2016), which will use proven practices, such as PMO and Project Portfolio Group.
- In the project initiation phase, the uncertainty character of the project must be assessed, and a proper project execution approach has to be selected.

SQ3: What are practical recommendations and theoretical contributions from this study?

- As an instance of a traditional manufacturing organisation, the Company efficiently performs well-defined development projects where the requirements are known at the project initiation.
- In the case of exploratory projects where (Lenfle, Midler, and Hällgren 2019) "neither goal nor the means to reach it" are elaborated, the Company struggles in performing these types of projects.
- This problem is mainly due to their uncertain character and, even more, because the Company does not fully recognise this uncertainty nor know the appropriate tactics for such projects.

MRQ: How does the traditional manufacturing organisation manage exploratory projects in the area of the unknown?

Conclusion

- The study reveals the importance of understanding the projects from an uncertainty perspective.

- If a project is recognized as exploratory and with a higher level of uncertainty, the organisation should set learning and gaining knowledge as the project's primary goals.

- If more tangible results drive the organisation, such exploitative projects must have realistic scopes and be well prepared and managed.

Conclusion

- Based on the findings from this longitudinal case study, we can conclude that exploratory projects are not unwanted or even odd forms of projects.

- On the contrary, with proper positioning of the exploratory projects within the organisation, careful scoping of such projects, and warranting stakeholders' support, the organisation can benefit from these projects to gain new knowledge and capabilities for future projects.

Conclusion

- Relevant theories for such exploratory projects setups are project management theory, organisational theory, stakeholders theory, and learning theory.

- We can encourage future research
  - in diversified project management approaches based on the assessed project characteristics,
  - analysing how different project-oriented organisational forms can be aligned with uncertain exploratory projects, and
  - analysing stakeholder management methods in the context of uncertainty.

Contact

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Phase 0.1   (2012-2013)

Ref.	Characteristic	Description
1	Organisational form	Small size projects (pre-development, research)
2	Complexity	Low
3	Unknown-unknowns estimation	54 (out of 100)
4	Organisational support	
	- Top management	Low
	- Mid management	Mid
	- Team members	High
5	Results and knowledge gained	
	- Technical	- The data model for the connected appliance representation is unified across product categories - The acquired knowledge was the basis for one doctoral thesis - Application and acquisition of one patent
	- Business	- Demonstration of the working prototypes to the target customers - Participation in a multidiscipline international research project
	- Organisational	- Creation of the core team of 3 experts
6	Known-unknowns estimation	46 (out of 100)

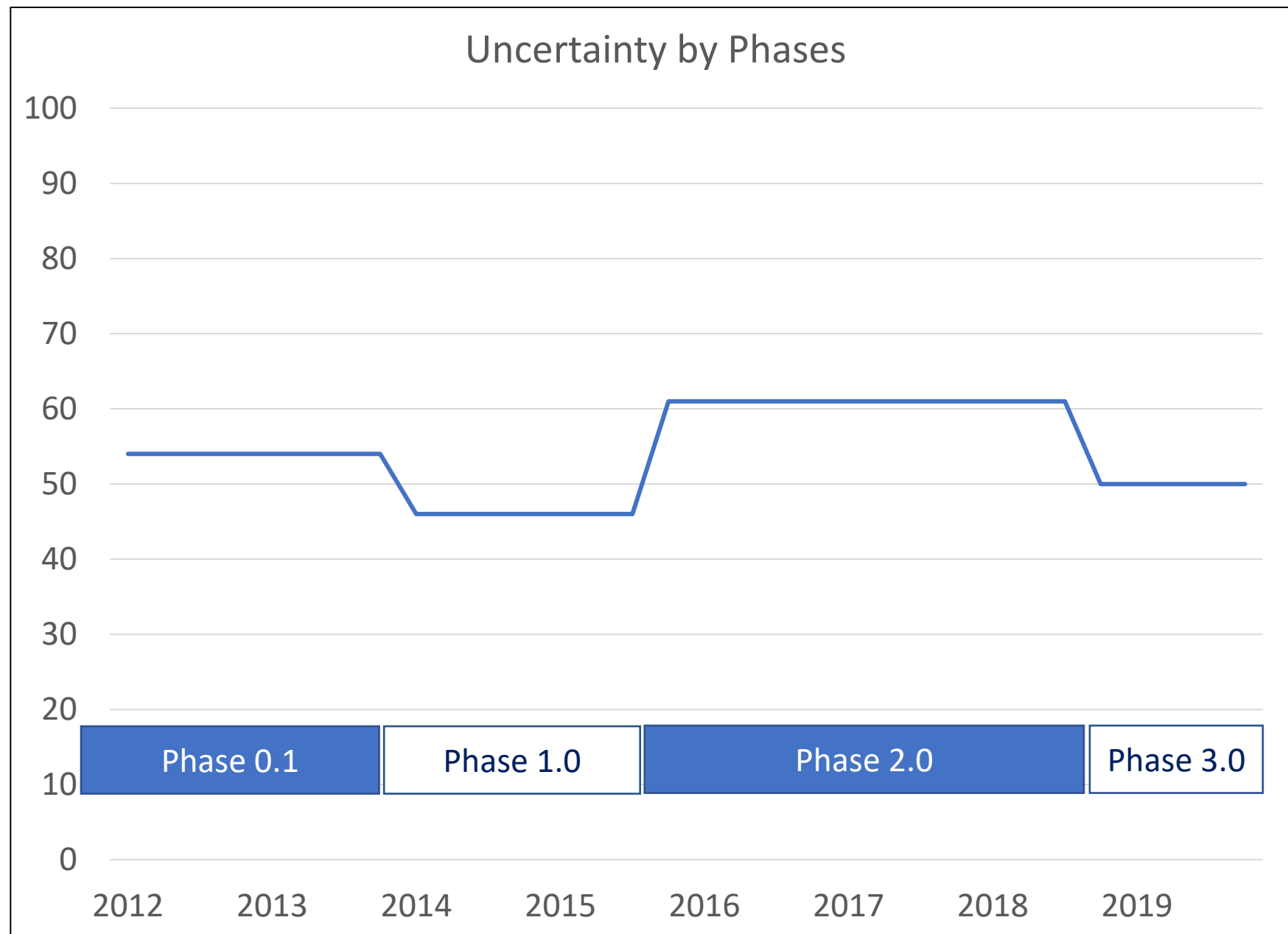| Ref.	Characteristic	Description
1	Organisational form	Program
2	Complexity	Mid
3	Unknown-unknowns estimation	46 (out of 100)
4	Organisational support	
	- Top management	High
	- Mid management	Mid
	- Team members	High
5	Results and knowledge gained	
	- Technical	- Technical specification defined - Communication HW and SW specified - Product categories selected - An initial set of product features defined
	- Business	- Strategic options analysed - Target markets identified - Business Plan prepared - Customers requirements gathering - Customer adoption rate estimated - Sales predictions estimated
	- Organisational	- Stakeholder analysis - Program Scope Statement elaborated - RFI, RFP executed - Strategic partners selected - Program governance and program/project teams defined - Board approval obtained
6	Known-unknowns estimation	54 (out of 100)

Phase 2.0   (2015-2018)

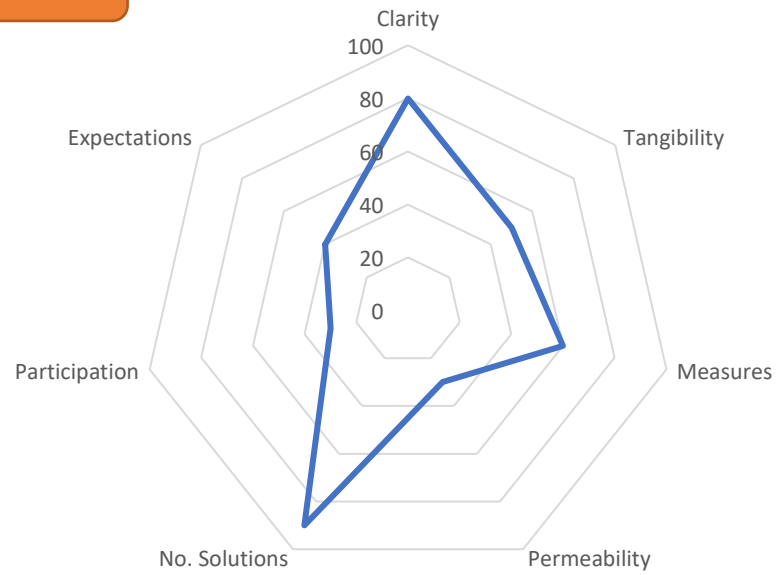| Ref.	Characteristic	Description
1	Organisational form	Project
2	Complexity	High
3	Unknown-unknowns estimation	61 (out of 100)
4	Organisational support	
	- Top management	High
	- Mid management	Low to Mid
	- Team members	Mid
5	Results and knowledge gained	
	- Technical	- Communication HW and SW implemented in different product categories/models - Product development and testing - IoT platform customised to the Company's needs - Mobile application development and testing - Integration of appliances, IoT platform, mobile application, back-end systems, and digital contents into a working solution - Production preparation (industrialisation)
	- Business	- Additional customers' requirements specified – a large number of changes - The decision for the premium brand products launches - Scope changes – decision for the extension from 2 to 5 (later to 7) product categories - Digital content preparation (customer-focused) - Customer adoption strategy defined - The first presentation on the international trade fair
	- Organisational	- Establishment of the core IT team and testing team - Further growth of the electronics team - Testing processes defined and executed - Balance Scorecard System and KPIs implemented - Adjustments to existing and new business processes defined - The demands for skilled resources not fulfilled on-time
6	Known-unknowns estimation	39 (out of 100)

Phase 3.0   (2018-2019)

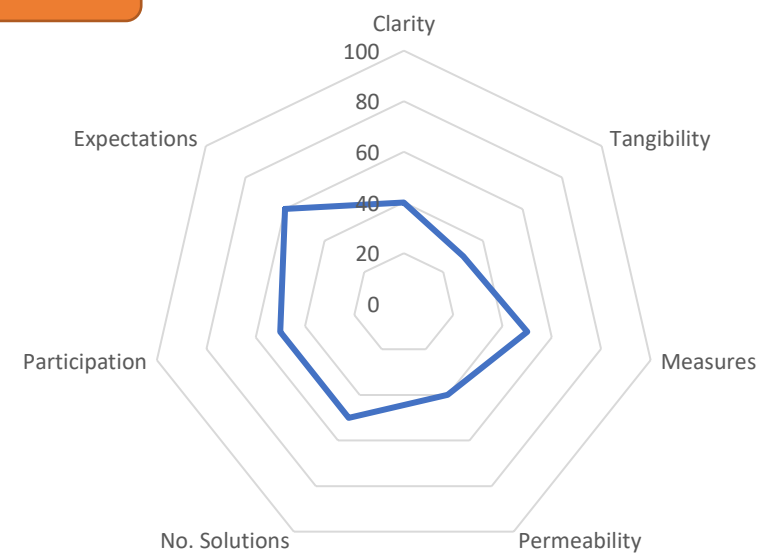| Ref.	Characteristic	Description
1	Organisational form	Multiple projects (future Program proposed)
2	Complexity	High
3	Unknown-unknowns estimation	50 (out of 100)
4	Organisational support	
	- Top management	High
	- Mid management	Mid
	- Team members	High
5	Results and knowledge gained	
	- Technical	- Consolidation of technical architectures for products, mobile application, IoT platform, back-end systems - Knowledge transfer among R&D teams
	- Business	- Change in Company's ownership - Updated connectivity strategy o Short term: Business continuity; Utilisation of past investments; Proof of Concept projects o Midterm: Solutions optimisation; Operations optimisation; Start of migration; Business-driven projects with new technologies o Long term: Operational consolidation and unification; Global/local business model(s) implementation; Business-driven projects with future technologies - Consolidation of procurement and supply chain
	- Organisational	- First joint development teams with representatives of the new owner - Joint planning
6	Known-unknowns estimation	50 (out of 100)