

Development roadmap from a traditional business model to Indoor-Environment- Quality-as-a-Service Business Model success

Overall results of WP1 and WP2

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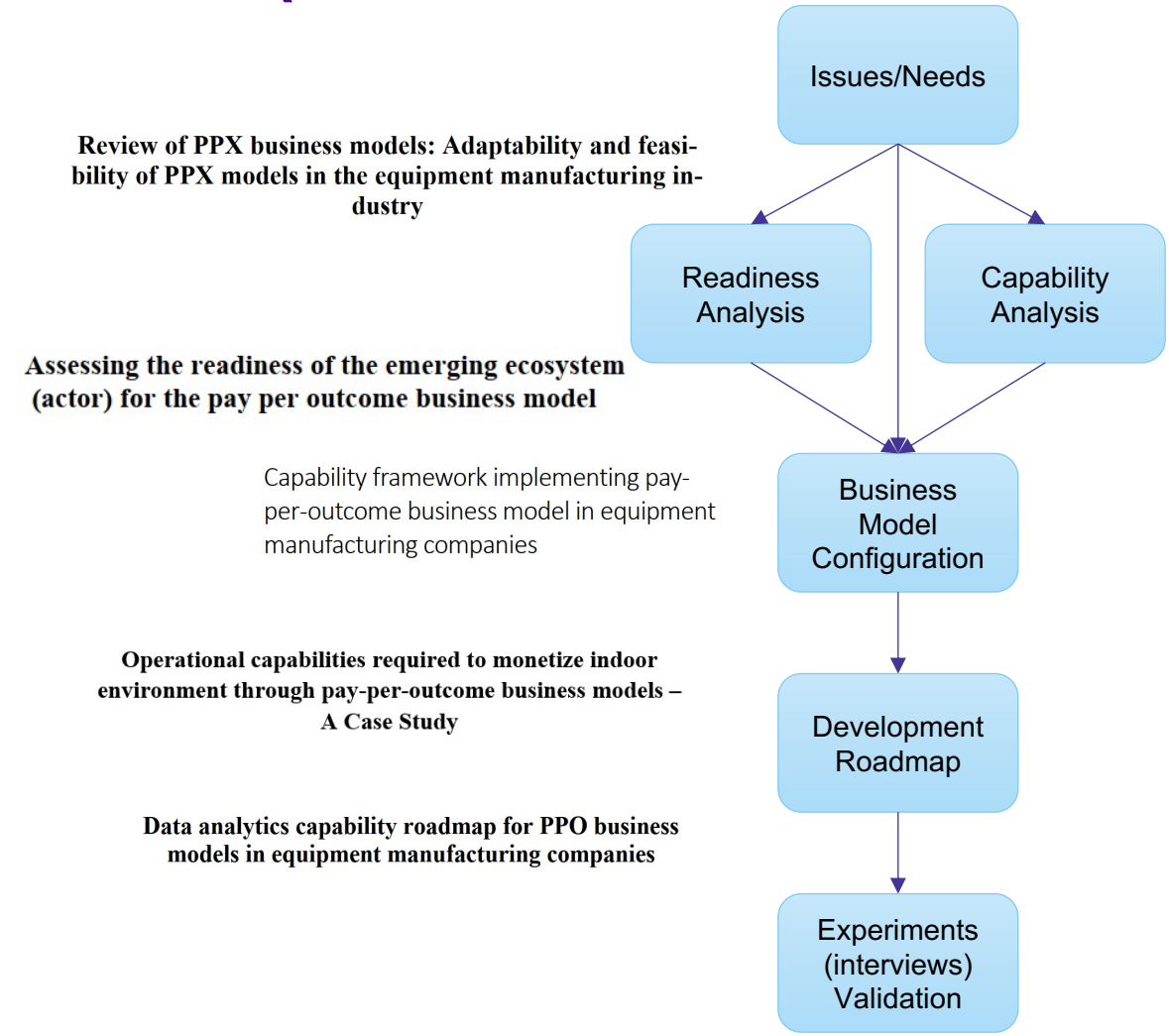
24.8.2022

Agenda

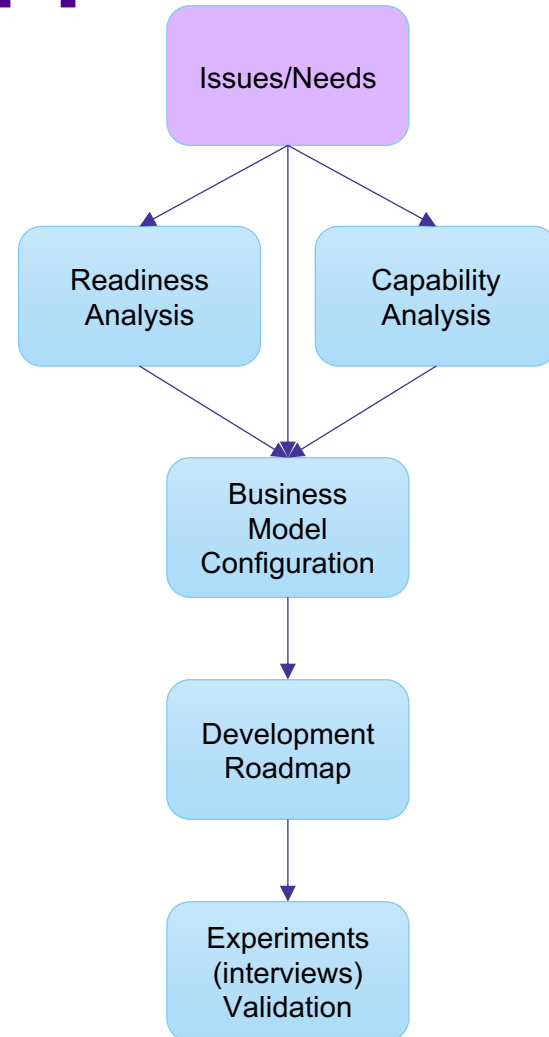
- Overall WP1 and WP2 outcomes
- IEQ-as-a-service Business Model: Issues, hindrances, opportunities via Case Bank
- IEQ-as-a-service business model Readiness – Future Spaces Ecosystem & Individual Companies
- IEQ-as-a-service business model design
- IEQ-as-a-service business model competence development
- IEQ-as-a-service business model roadmap

Overall WP1 and WP2 outcomes

What have we done overall? - WP1 and WP2 outcomes (Business Model development)



IEQ-as-a-service Business Model: Issues, hindrances, opportunities via Case Bank



IEQ-as-a-service Business Model: Issues, hindrances, opportunities via Case Bank

Categorization of case studies

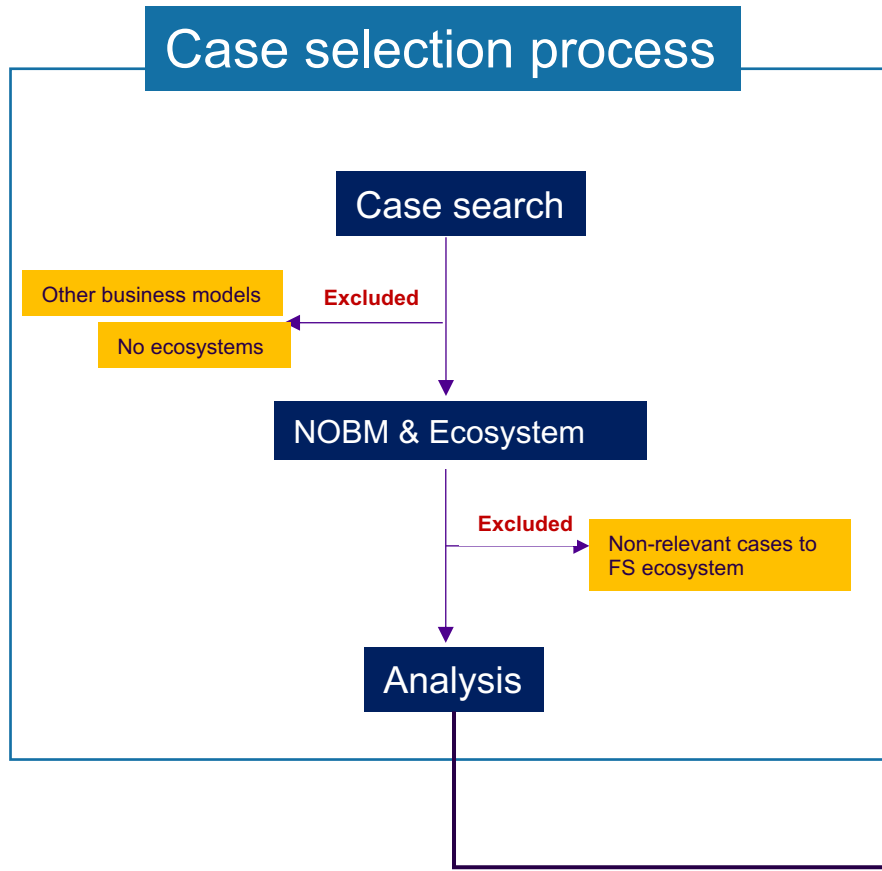
Case No	Industry	Pay per outcome	Pay per use	Ecosystem perspective
Case 1	Solar energy	X		X
Case 2	Water purifier		X	X
Case 3	Distributed energy		X	X
Case 4	Aircraft manufacturing	X		X
Case 5	Multi industry		X	X
Case 6	Mobility service		X	X
Case 7	Electric vehicle		X	X
Case 8	Music		X	X
Case 9	Photovoltaic facilities	X		X
Case 10	Aerospace	X		X

Cases

- Case 1: Business model translation- The case of spreading a business model for solar energy
- Case 2: Exploring the challenges for circular business implementation in manufacturing companies: An empirical investigation of a pay-per-use service provider
- Case 3: Collaboration mechanisms for business models in distributed energy ecosystems
- Case 4: The transition from products to solutions: External business model fit and dynamics
- Case 5: The ecosystem blueprint: How firms shape the design of an ecosystem according to the surrounding conditions
- Case 6: Prototype business models for Mobility-as-a-Service
- Case 7: Business Model Design in an Ecosystem Context
- Case 8: The Service-Dominant Ecosystem: Mapping a Service Dominant Strategy to a Product-Service Ecosystem
- Case 9: Developing and managing photovoltaic facilities based on third-party ownership business models in buildings
- Case 10: Outcome-based contracts as new business model: The role of partnership and value-driven relational assets

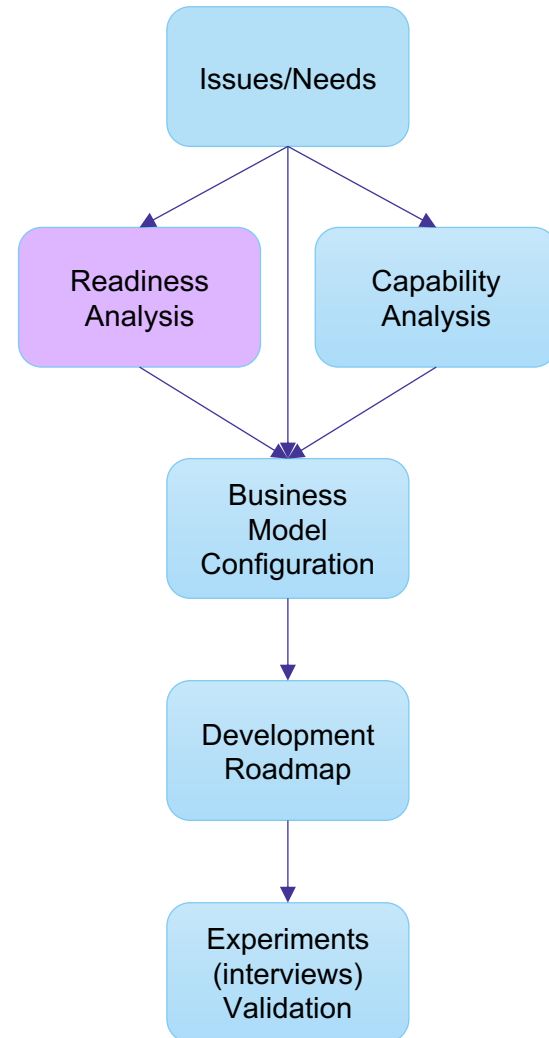
IEQ-as-a-service Business Model: Issues, hindrances, opportunities via Case Bank

Case bank structure



- **Case background**
 - What is industry, type of service or product offering
 - Customer segment
 - B2B
 - Ecosystem and actors
 - How it related to FS companies/ ecosystem
- **Type of NOBM adopted in the case**
- **Measurables related to above NOBM**
- **Factors impacting NOBM**
 - Drivers
 - Enablers
 - Hindrances/ Challenges
- **Ecosystem for NOBM**
 - Actors roles and relationships
 - Value exchange between the actors
 - Challenges faced during ecosystem design, collaboration with actors
- **Learnings for FS companies / ecosystem (from this case)**
 - Resource needed to implement NOBM
 - NOBM components changes related to business model canvas
 - Ecosystem perspective (actors and roles in the ecosystem, value exchange between actors)
- **Figures**
 - Transactions/ value exchange between actors in the ecosystem
 - Map of an ecosystem with actors, an ecosystem with customers

IEQ-as-a-service business model Readiness – Future Spaces Ecosystem & Individual Companies



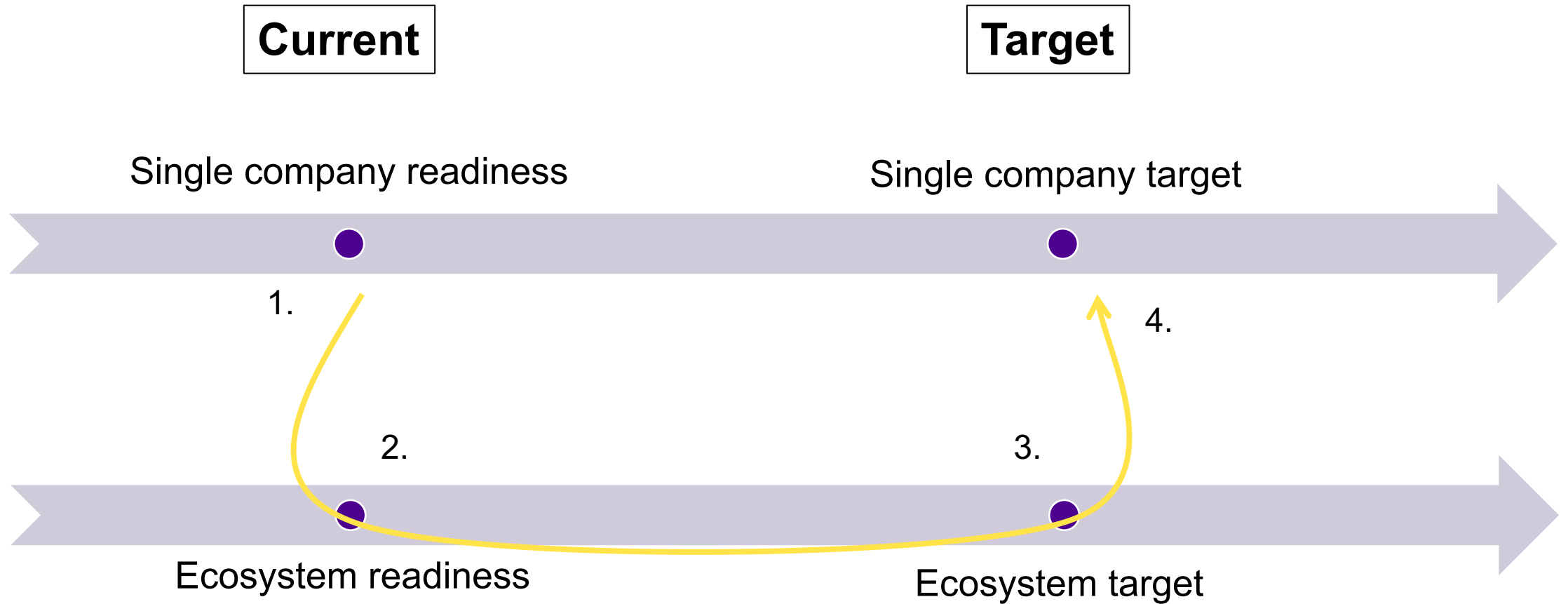
IEQ-as-a-service business model Readiness

– Future Spaces Ecosystem & Individual Companies

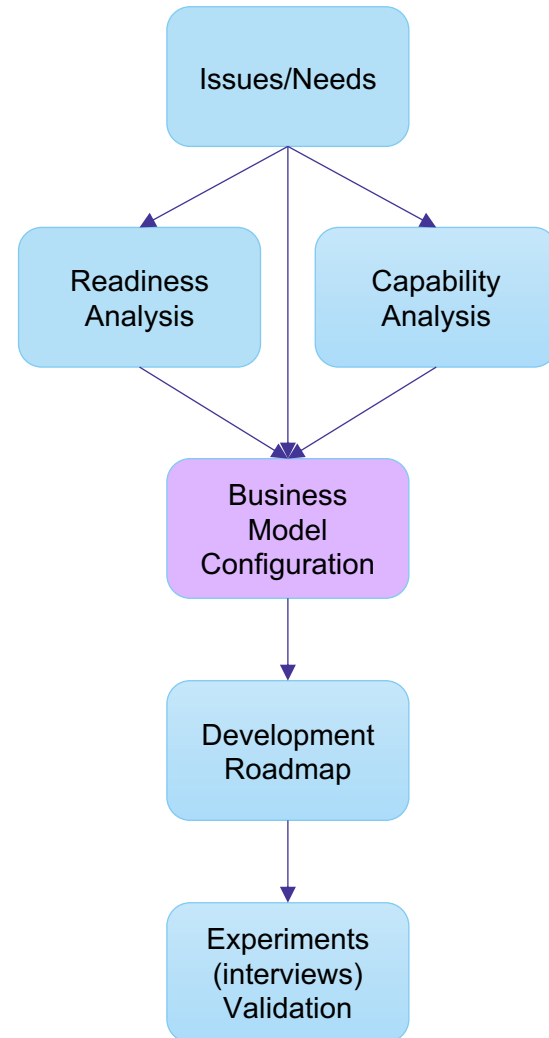
Organisational Governance	Risk Management	Competences & Culture	Product Lifecycle Processes	Technology	Data Analytics	Strategy
Operational governance	Business Risks	Competences	Beginning of Life	Smart Product & factory	Data Access	Business Strategy
People governance	Operational Risks	Culture	Middle of Life	Connectivity	Data Analysis	Strategic Alignment
Data & information governance	Cybersecurity Risks		End of Life		Data Utilization	Resource Allocation

The Pay-Per-X readiness model dimensions

Two levels of analysis – for full PPX



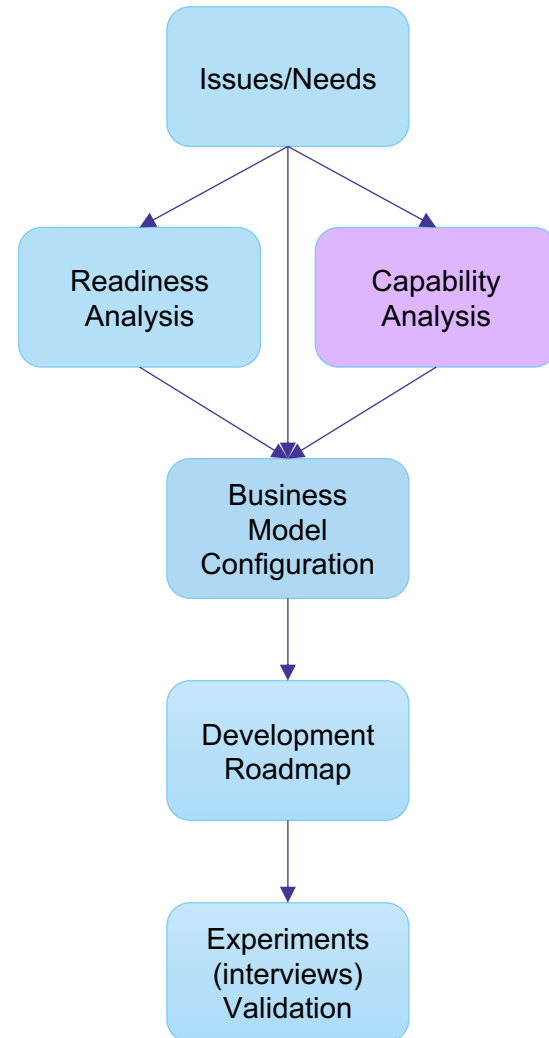
IEQ-as-a-service business model design

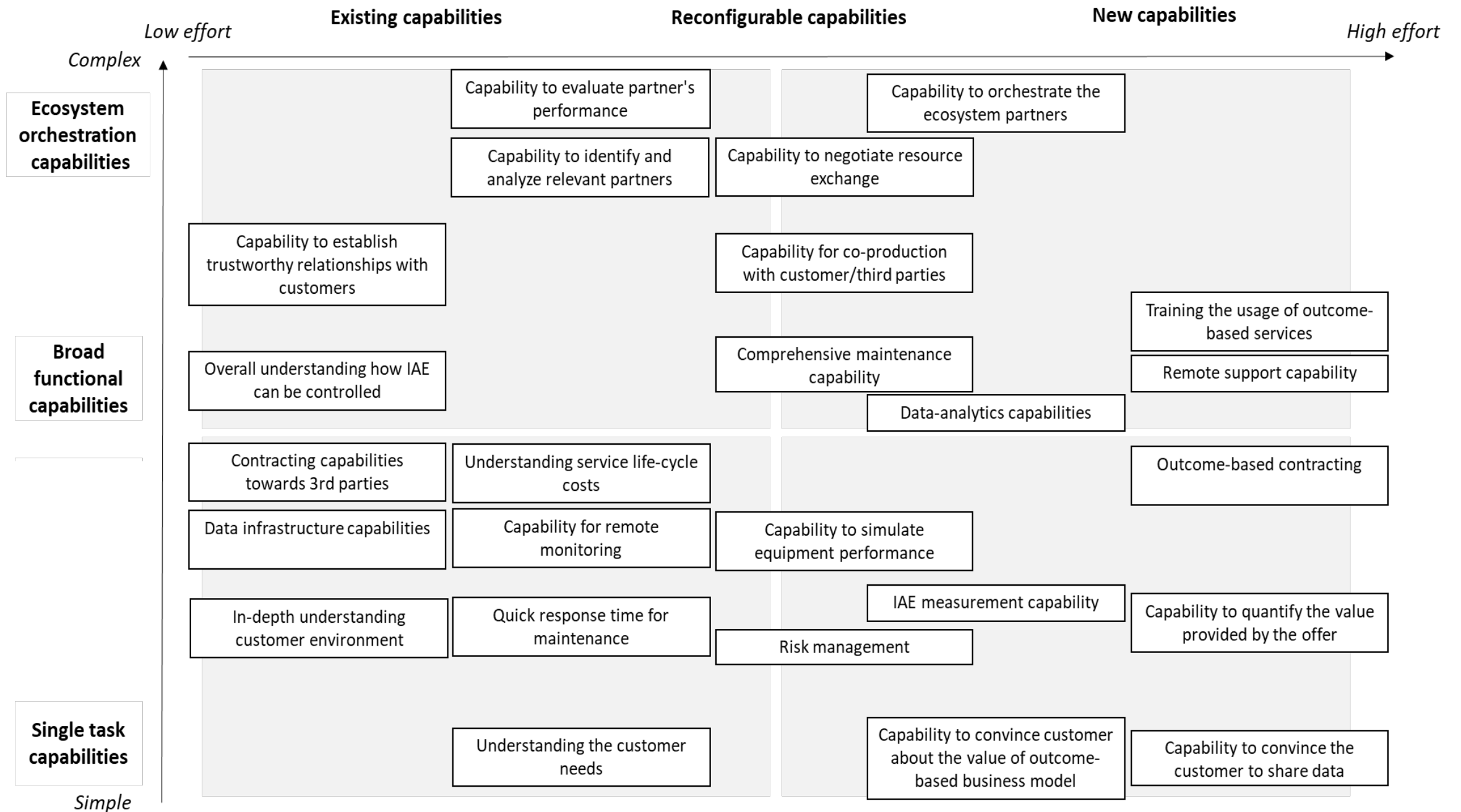


IEQ-as-a-service business model design

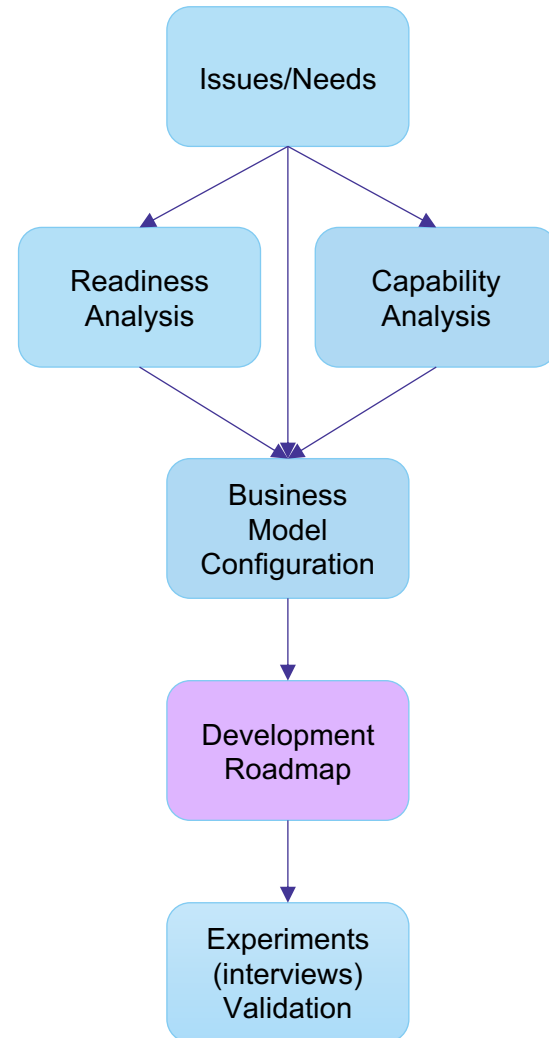
Characteristic Features		Options				
OWNERSHIP (Non-Human Resources)						
Ownership of Equipment/ Machine	During the phase of use	Customer	Leasing Bank/financial institutions	Machine Builder	Others	
	After the phase of use	Customer	Leasing Bank/financial institutions	Machine Builder	Others	
Ownership of Software	Design Related Software for the Machine	Customer	Leasing Bank/financial institutions	Machine Builder	Others	
	Production Related Software for the Machine	Customer	Leasing Bank/financial institutions	Machine Builder	Others	
	Maintenance Related Software for the Machine	Customer	Leasing Bank/financial institutions	Machine Builder	Others	
Ownership of Data	Production Related Data for the Machine	Customer	Third Party (Platforms or someone else)	Machine Builder	Others	
	Maintenance Data from the machine	Customer	Third Party (Platforms or someone else)	Machine Builder	Others	
Ownership of Raw Materials	Specifications Related to Raw Materials and Raw Materials Required to Manufacture the Product	Customer	Third Party (Platforms or someone else)	Machine Builder	Others	
Ownership of Consumables	Required to Run the Machines	Customer	Third Party (Platforms or someone else)	Machine Builder	Others	
BEGINNING-OF-LIFE (MACHINE RELATED OPERATIONS)						
Responsibility for the Design of Machine		Customer	Third Party (Platforms or someone else)	Machine Builder	Others	
Responsibility of Machine Installation		Customer	Third Party (Platforms or someone else)	Machine Builder	Others	
Responsibility of Machine Deinstallation		Customer	Third Party (Platforms or someone else)	Machine Builder	Others	
Contracting and Payment	Payment Model	Pay-per-Use	Pay-per-Output	Pay-per-Outcome	Hybrid	Others
	Single or Multiple Customer Operations (at the same time)	Single	Multiple		Hybrid	Others
	Single or Multiple Customer Operations (during the lifecycle of the machine sequentially in terms of PPX contracts)	Single	Multiple		Hybrid	Others
	Duration of Contract	Less than 1 year	1 to 3 years		3 to 5 years	More than years
	Contract Handling Responsibility	Customer	Third Party (Platforms or someone else)	Machine Builder	Others	
	Insurance of the Machine	Customer	Third Party (Platforms or someone else)	Machine Builder	Others	
MIDDLE-OF-LIFE (MACHINE RELATED OPERATIONS)						
Operation of Machine Related	Location of the Operations	Customer	Third Party (Platforms or someone else)	Machine Builder	Others	
	Logistics Related to the Machine	Customer	Third Party (Platforms or someone else)	Machine Builder	Others	
	Skills and Training Related to the Operation of Machine	Customer	Third Party (Platforms or someone else)	Machine Builder	Others	
	Responsibility for Manufacturing the End-Product Using the Machine	Customer	Third Party (Platforms or someone else)	Machine Builder	Others	
	Responsibility for Maintenance of the Machine	Customer	Third Party (Platforms or someone else)	Machine Builder	Others	
END-OF-LIFE (MACHINE LIFE RELATED OPERATIONS)						
Recycling of the Machine		Customer	Third Party (Platforms or someone else)	Machine Builder	Others	
Scrapping of the Machine		Customer	Third Party (Platforms or someone else)	Machine Builder	Others	
Modernization of the Machine		Customer	Third Party (Platforms or someone else)	Machine Builder	Others	
Reselling of the Machine		Customer	Third Party (Platforms or someone else)	Machine Builder	Others	

IEQ-as-a-service business model competence development





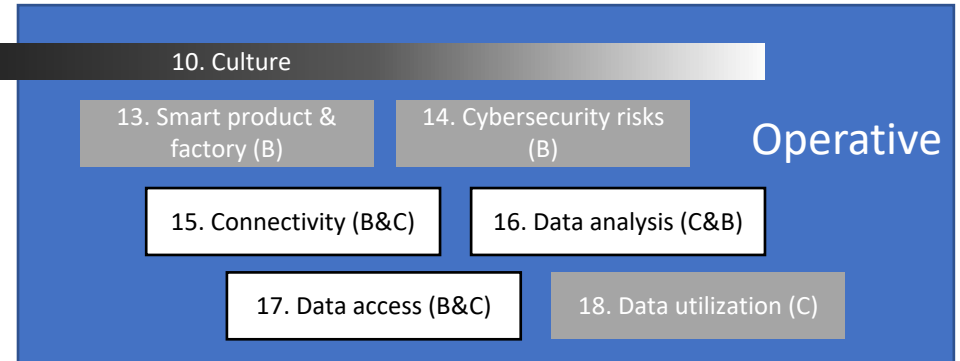
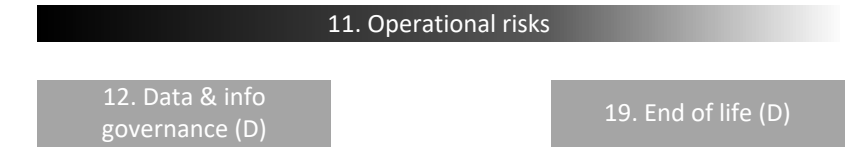
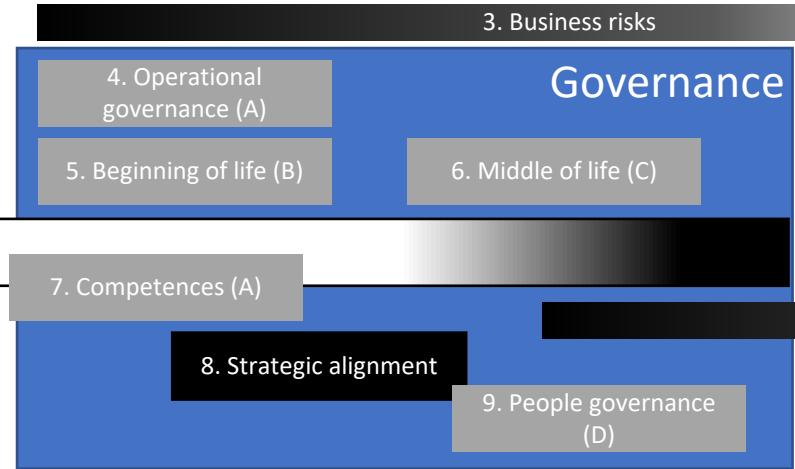
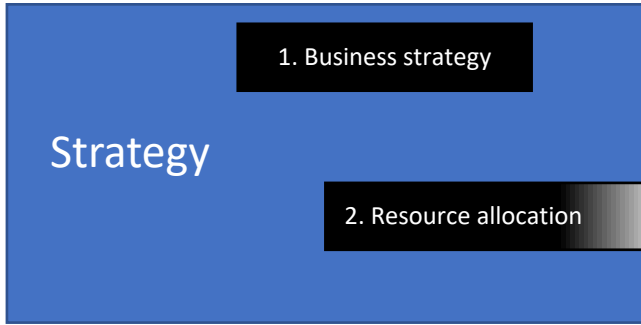
IEQ-as-a-service business model roadmap



Phase 1: Foundation

Phase 2: Organizing

Phase 3: Implementing



- Defining the business strategy for the consortium, incl.
 - Organizational structure
 - Target market(s)
 - Offering and responsibilities
 - Investments and revenue expectation
 - Responsibilities in development (other steps)
 - Needed capabilities
 - Sharing of risk/reward
 - Agreeing on how the first customer cases are built,
 - Which cases to target
 - How to acquire
 - How to plan and execute
 - How to share the risk/reward for pilots
- Allocating development resources for the other steps

- Identifying the business risks for each company and consortium (continuous)
- Creating (a first version of) operational governance for the proposed organizational structure(s)
- Planning the development phase of the service (design of the customer solution)
- Planning how the 10+ year service is executed in reality
 - Who, how, when, where
 - How to source needed capabilities for the contract duration
- Define needed competences for the new organization, identify each company's available competences and competence gaps
- Agree on the resource allocation of the new company
- Create alignment with each company's existing business, create rules for resource usage and sharing. Create contingencies for individual companies' focus shifts
- Create processes for people governance (in company and between companies)
- Create a plan for integration of the participating teams' cultural and operational alignment

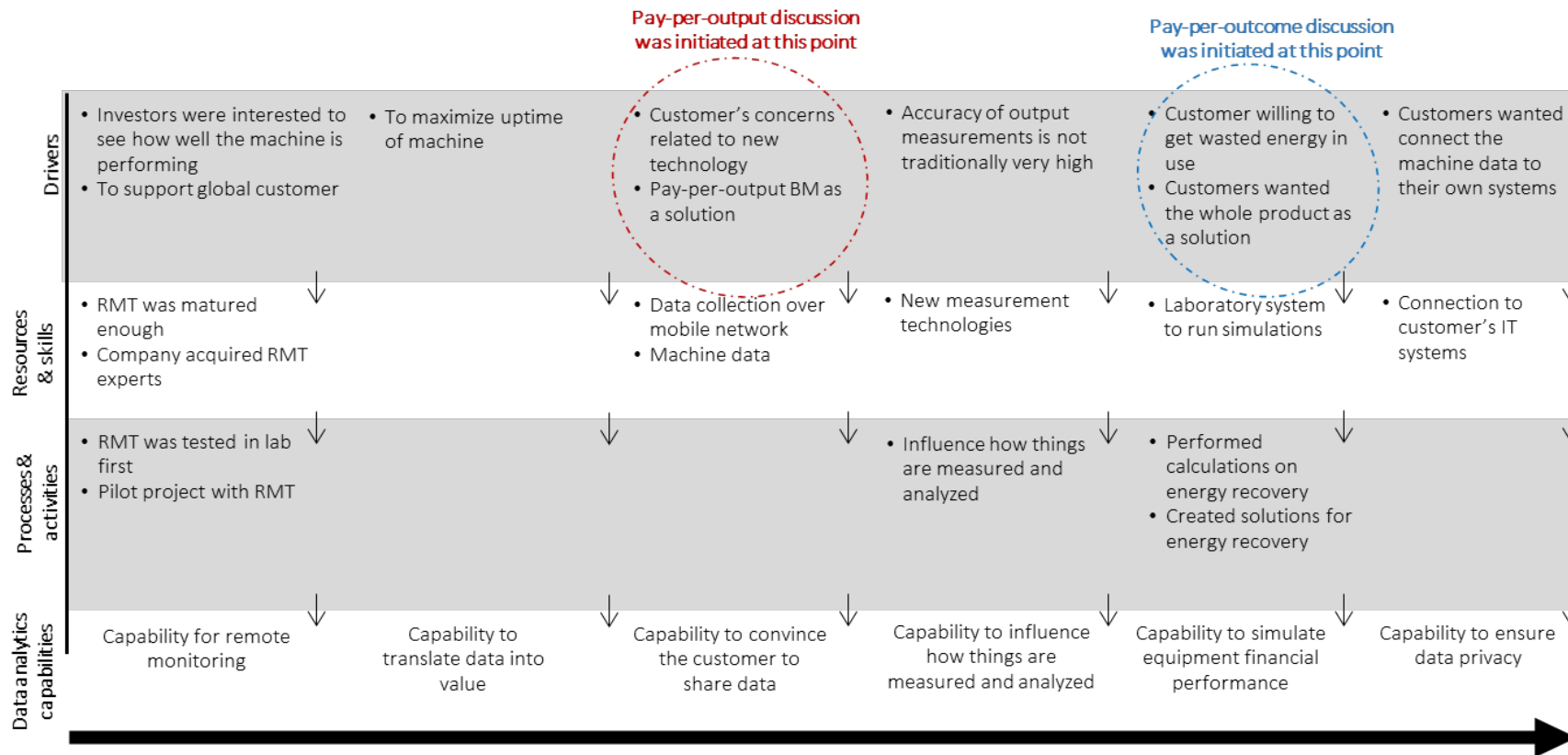
- Create a continuous process for operational risk management. Agree on thresholds, authorities and escalation processes
- Create a model for data and information security management. Create rules for data sharing within the participating companies.
- Collect existing and define new monitoring requirements. Make a plan for IT infrastructure for the new organization
- Create a cybersecurity strategy and operational guidelines
- Make a plan for needed connectivity to carry out the service
- Make a plan for data analysis in the life cycle of the service
- Create data access and instructions for the participating organization (and customer)
- Make a trial of data utilization based on a pilot/imaginary case. Identify investment and development needs
- Create a concept for end-of-life management, when the first contract ends.

All participate fully
Lead by one
Individual

A – Company A; B – Company B; C – Company C; D – Company D

IEQ-as-a-service business model specific roadmap – Data analytics

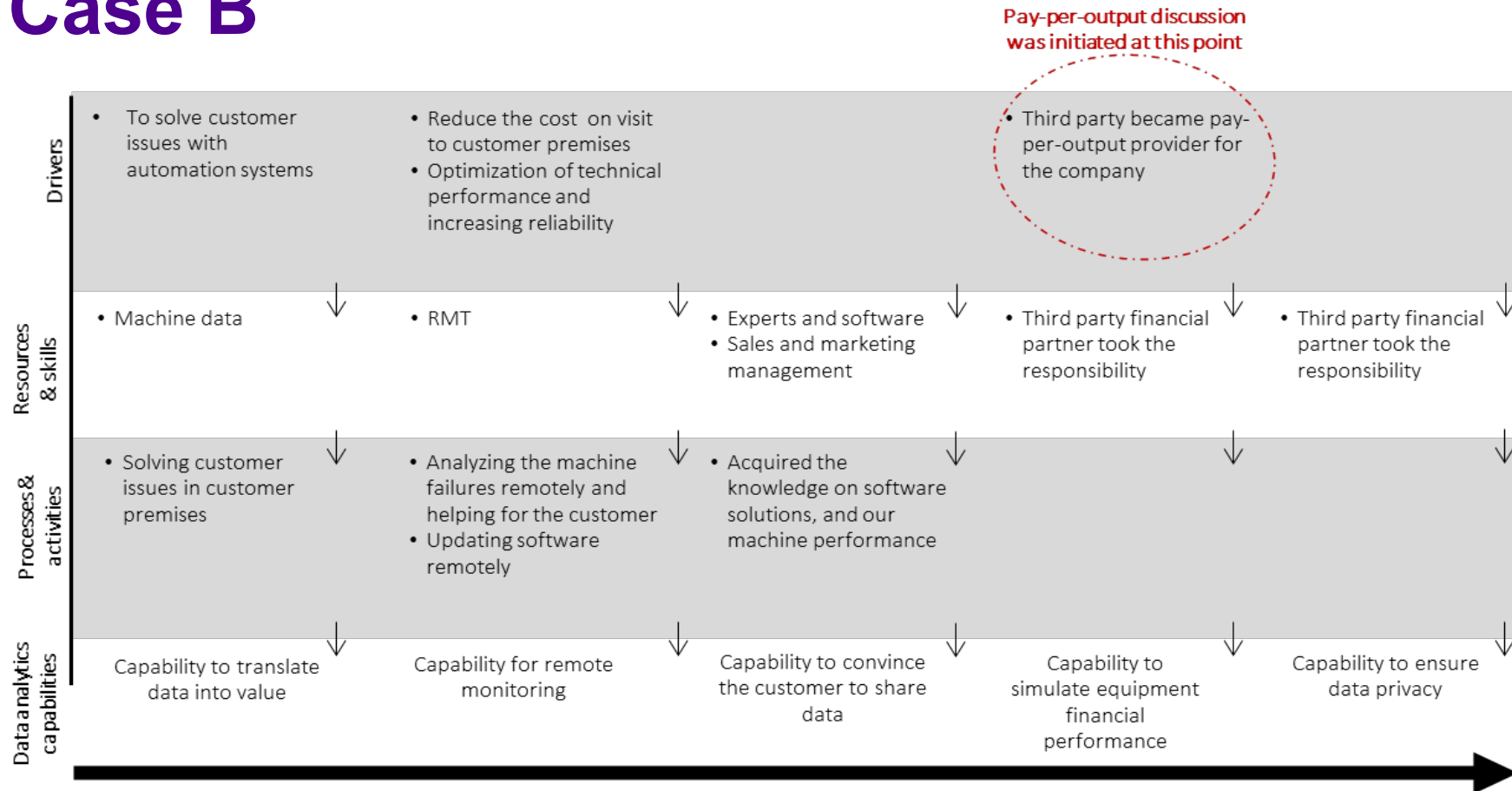
Data analytics capability development roadmap –Case A



- The development of data analytics capabilities was initiated before implementation of PPO business model
- Established remote monitoring technologies to monitor the equipment performance.
- Pay-per-output business model was initiated but no equipment output measurements are not standardized at industry level.

Case A - Data analytics capability development roadmap

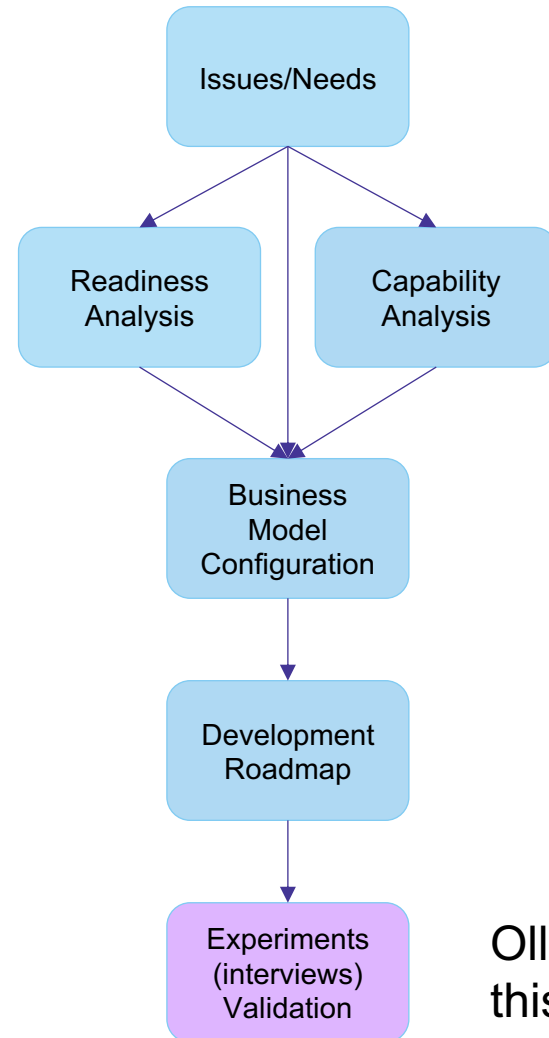
Data analytics capability development roadmap- Case B



- Established *remote monitoring* technologies to solve equipment issues quicker and to save cost of travelling.
- Company established third party collaboration to migrate the risks associated with the development of data analytics capabilities
- The third party had capability to simulate equipment financial benefits and capability to ensure data privacy and security

Case B - Data analytics capability development roadmap

IEQ-as-a-service business model roadmap



Olli Kuismanen will talk about this after this presentation

- Case bank – Available in the FS repository
- Readiness Model related paper
 - Upcoming paper in Pro-Ve conference 2022 - Prasanna Kumar Kukkamalla, Veli-Matti Uski, Olli Kuismanen, Hannu Kärkkäinen, Karan Menon - Assessing the readiness of the emerging ecosystem (actor) for the pay per outcome business model
- Business Model design related paper
 - Paper - Uski, Veli-Matti, Prasanna Kumar Kukkamalla, Hannu Kärkkäinen, Karan Menon, Sameer Mittal, Muztoba Ahmad Khan, and Thorsten Wuest. 2022. “Review of PPX Business Models: Adaptability and Feasibility of PPX Models in the Equipment Manufacturing Industry.” In Product Lifecycle Management. 639:358–72. IFIP Advances in Information and Communication Technology. Cham: Springer International Publishing.
- Competence development related paper
 - Uski, Veli-Matti, Prasanna Kumar Kukkamalla, Hannu Kärkkäinen, and Karan Menon. 2022. “Capability Framework Implementing Pay-Per-Outcome Business Model in Equipment Manufacturing Companies.” Journal of Business Models 10 (1): 12
 - Veli-Matti Uski, Sameer Mittal, Prasanna Kumar Kukkamalla, Olli Kuismanen, Mia Ala-Juusela, Hannu Kärkkäinen, Karan Menon - Operational capabilities required to monetize indoor environment through pay-per-outcome business models – A Case Study
- Data analytics related paper
 - Upcoming paper in PLM 2022 conference - Prasanna Kumar Kukkamalla, Veli-Matti Uski, Olli Kuismanen, Hannu Kärkkäinen, Karan Menon - Data analytics capability roadmap for PPO business models in equipment manufacturing companies
- Overall roadmap related report – will be made available in the FS repository

Thank you!

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