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Curriculum Development of Master's Degree Program in Industrial Engineering for Thailand Sustainable Smart Industry

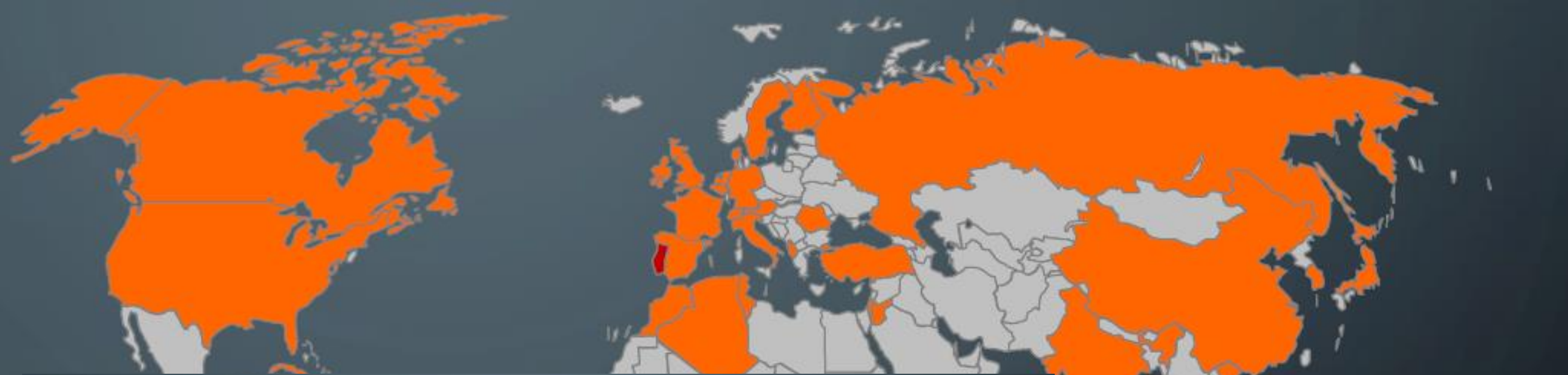
Project Management for Industry 4.0

Rui M. Lima

(School of Engineering of University of Minho)



Curriculum Development
of Master's Degree Program in
Industrial Engineering for Thailand Sustainable Smart Industry





Universidade do Minho



people

- **19 100 students** + 1 500 online
(2 100 foreigners)
- **1 300 faculty**
910 as full-time academic staff (98% PhD)
- **880 technical and administrative staff**
- **280 researchers**
155 holding a PhD degree



PM4I4

14.0 Project related issues

14.0 Project Management
Issues

14.0

Company current state

14.0

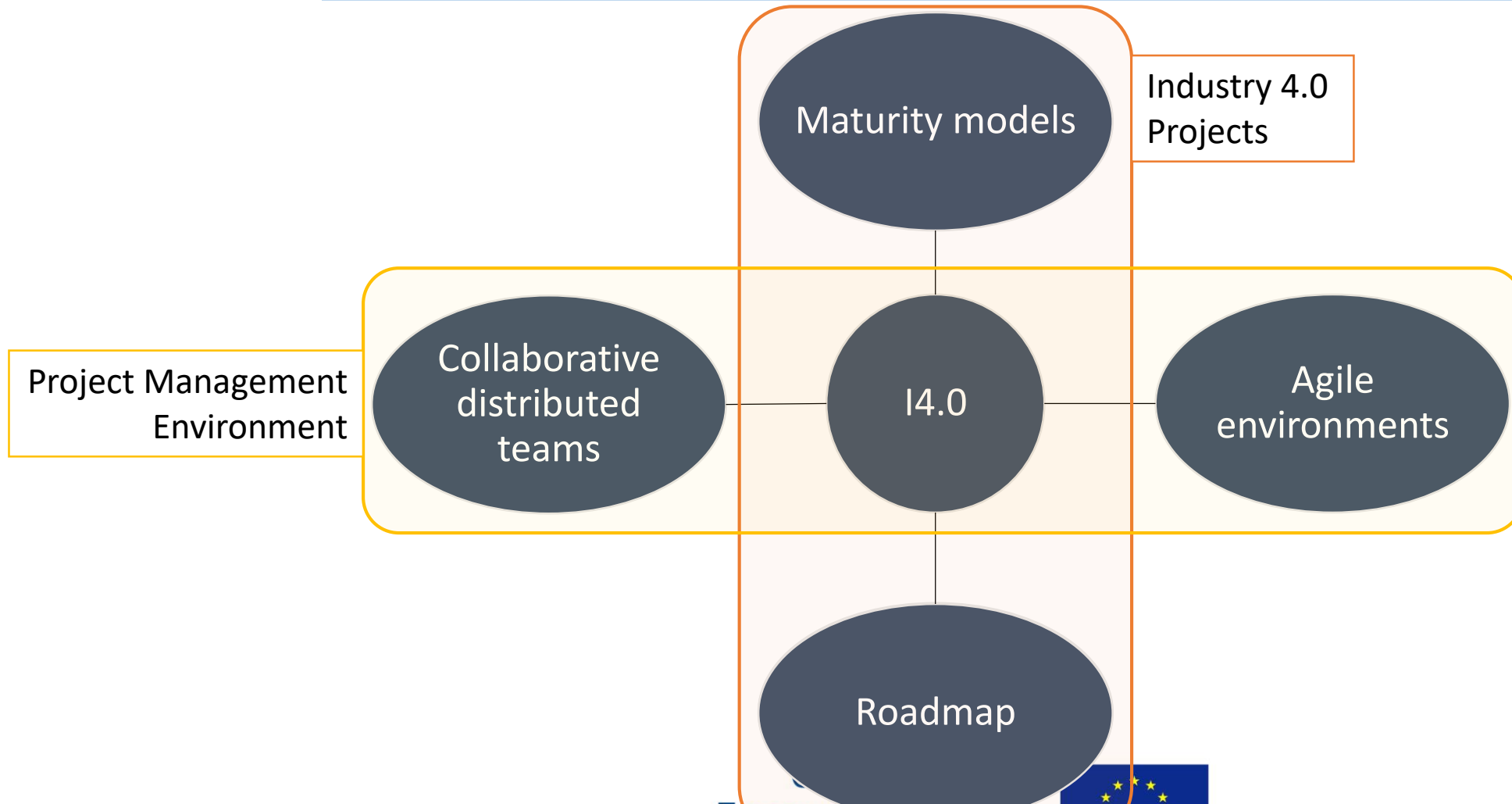
Implementation
projects

PM

Concepts and
frameworks

PM

Changing environment





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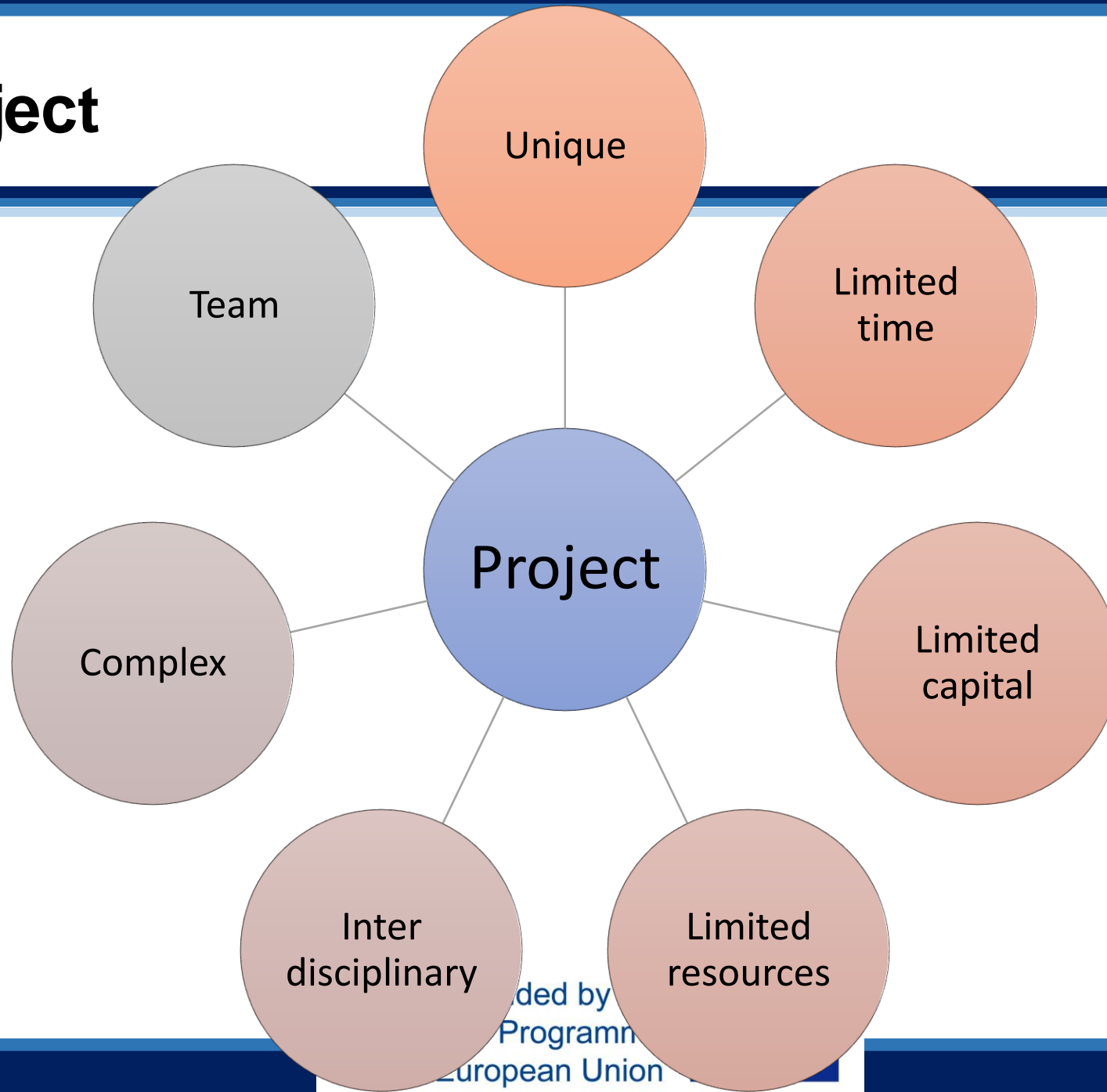


Project Management for Industry 4.0

Project Management related issues



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PMI – Project Management Institute

PMBOK Knowledge Areas Overview



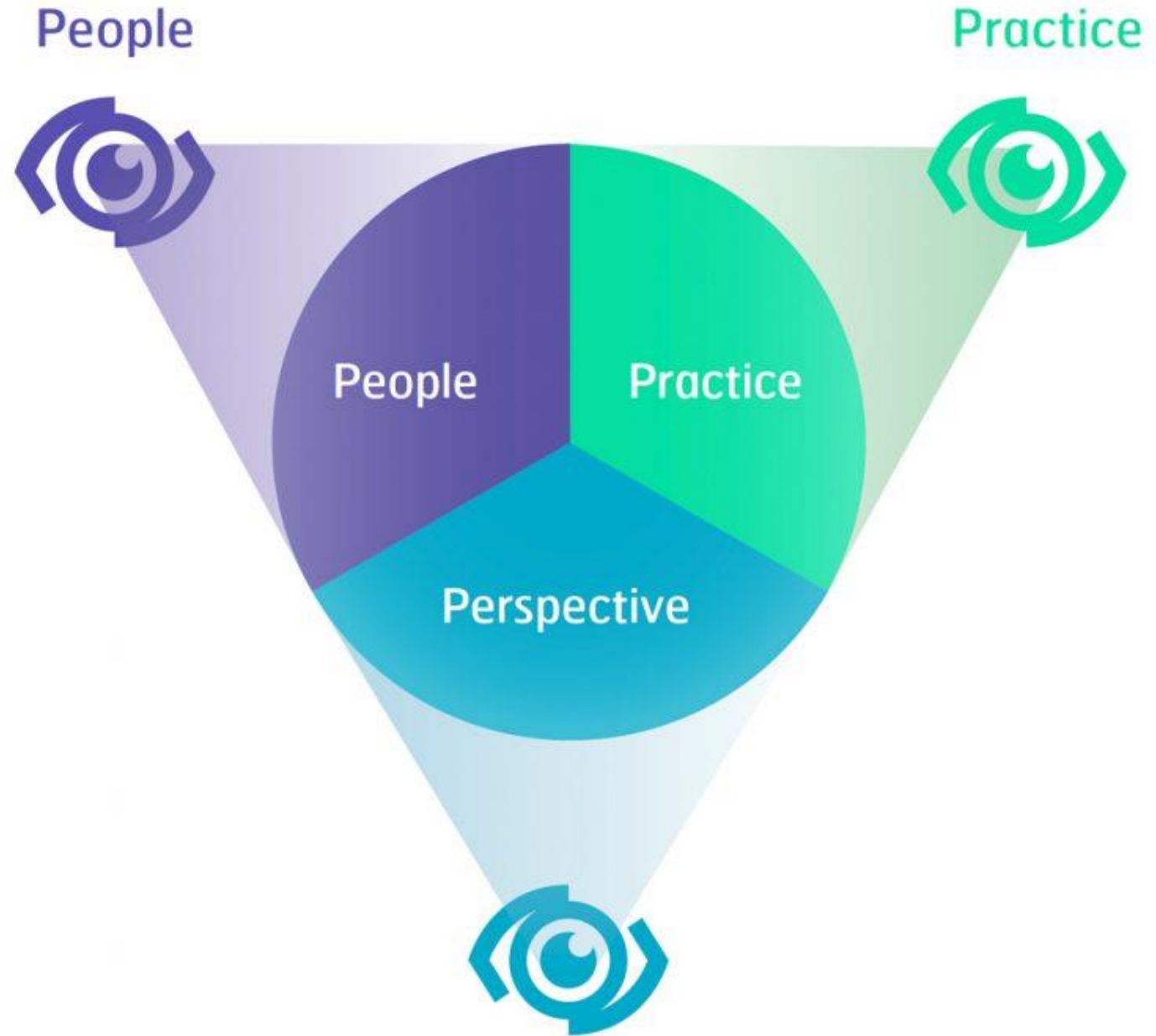


Project - IPMA

- IPMA competence baseline

PEOPLE Competences

- Self-reflection and self-management
- Personal integrity and reliability
- Personal communication
- Relationships and engagement
- Leadership
- Teamwork
- Conflict and crisis
- Resourcefulness
- Negotiation
- Results orientation



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Perspective

Project Management

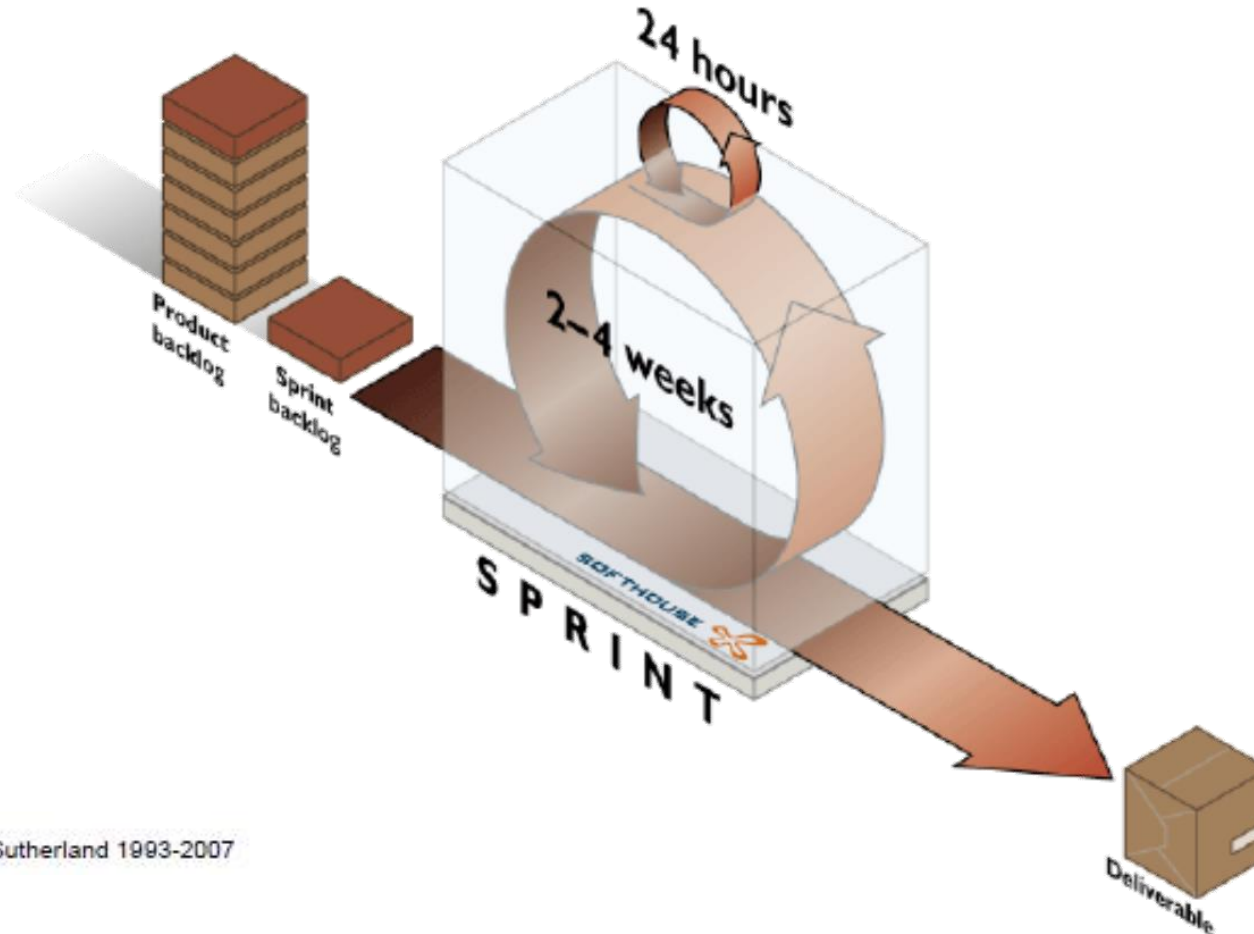
Predictive	Iterative - Incremental	Agile
Requirements are defined up-front before development begins.	Requirements can be elaborated at periodic intervals during delivery.	Requirements are elaborated frequently during delivery.
Deliver only a single final product at the end of Project timeline.	Delivery can be divided into subsets of the overall product.	Delivery occurs frequently with customer-valued subsets of the overall product.
Changes are restricted as much as possible.	Changes are incorporated at periodic intervals.	Changes is incorporated in real-time during delivery.
Key stakeholders are involved at specific milestones.	Key stakeholders are regularly involved.	Key stakeholders are continuously involved.
Risk and cost are controlled by detailed planning of most knowable considerations.	Risk and cost are controlled by progressively elaborating the plans with new information.	Risk and cost are controlled as requirements and constraints emerge.

Slide by André Luiz Aquere (UnB)

(PMBOK, 6th Edition)

Agile Project Management

Scrum – inspect and adapt framework



© Jeff Sutherland 1993-2007

Collaborative (Distributed) Teams

Framework (technology point of view)

	Synchronous	Asynchronous
Communication	Telephone Cell phone Video conference Chat	Email Voice mail Blogs Social network
Sharing	Whiteboards Application sharing Distance meeting tools Virtual worlds	Document repositories Wikis Web sites Team workspaces
Coordination	Meeting management Document development	Project management Workflow management Calendar scheduling

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Zoho Projects

Asana

LiquidPlanner

Podio

Slack

LeanKit

Airtable

Basecamp

Glip by RingCentral

Wrike



Lowest Price

SEE IT

SEE IT

SEE IT

SEE IT

SEE IT

SEE IT

SEE IT

SEE IT

SEE IT

Editors' Rating



EDITORS' CHOICE



EDITORS' CHOICE



EDITORS' CHOICE



EDITORS' CHOICE



EDITORS' CHOICE



EDITORS' CHOICE



Best For

Project Management

Workflow Management

Project Management

Work Hub

Team Chat

Lean Kanban

The 11 Best Online Whiteboards

- [IPEVO Annotator](#) (macOS, iOS, Windows, Android) for annotations and presentations
- [Limnu](#) (Web, Android, iOS) for a realistic whiteboard experience
- [InVision Freehand](#) (Web, Android, iOS) for annotating design files with a team
- [Stormboard](#) (Web) for creating multiple whiteboards in a single brainstorming session
- [AWW](#) (Web) for embedding a live whiteboard on a web page
- [RealtimeBoard](#) (Web, Mac, Windows, iOS, Android) for formal presentation of your whiteboard
- [Sketchboard](#) (Web) for saving and organizing multiple, unrelated whiteboards
- [Conceptboard](#) (Web) for large, complex whiteboards
- [Explain Everything](#) (Web, iOS, Android, ChromeOS) for creating whiteboard videos
- [Whiteboard Fox](#) (Web) for quick, informal whiteboard sessions
- [MURAL](#) (Web) for remote, multi-member team meetings

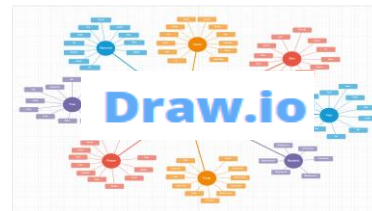


techradar.pro

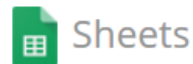
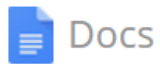
BEST ONLINE COLLABORATION TOOLS

Collaborative Software

1. Slack
2. Asana
3. Podio
4. Ryver
5. Trello
6. Flock



Google



Collaborative (Distributed) Teams

The image shows a Miro Kanban board with four columns: Product Backlog (4 items), Sprint Backlog (2 items), In progress (0 items), and Done (0 items). The Product Backlog is divided into Team A' (4 items) and Team A'' (2 items). Team A' items are 'Building - part 2' and 'Building - part 3'. Team A'' items are 'Building - part 4' and 'Building - part 5'. The Sprint Backlog contains 'Building - part 1' and 'Type something'. The In progress and Done columns are empty. A toolbar on the left contains various editing tools.

miro | Kanban board ☆ |

Kanban

Product Backlog | 4

Team A' | 4

- Building - part 2
- Building - part 3

+

Team A'' | 2

- Building - part 4
- Building - part 5

+

Sprint Backlog | 2

- Building - part 1
- Type something

+

In progress | 0

+

+

Done | 0

+

+



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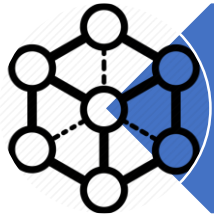
Project Management for Industry 4.0

Industry 4.0 Project related issues

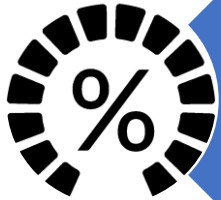
Rui Lima and Cristiano de Jesus



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Frameworks are collections of procedures, methods and tools focused on the design of an organizational architecture or a system.



Readiness assessments are evaluation and analysis tools that aim to determine the level of preparedness of an organization in terms of conditions, attitudes and resources.



Maturity models are models that help organizations achieve expected skills in specific dimensions such as culture, processes, resources, etc., through continuous improvement processes.



Roadmaps are "plans that match short-term and long-term goals with specific technology solutions to help to meet those goals".

Procedure for Adoption and Application of Maturity Models

Phase	Decision	Characteristics
Define Scope	Focus/Breadth	Generic Model
		Specific Model
	Audience	Management-oriented
		Technology-oriented
Design	Maturity Definition	Dimensions and parameters
	Goal Function	Multi-Dimensional
	Design Process	Literature, practitioner and research driven
	Application Method	Self-Assessment or Third Party certified professional
	Respondents	Combination of internal (staff) and external (partners)
Populate	Measures	What needs to be measured and how
Evaluate Design	Test Model Structure	Evaluate deployment measures
Evolution	Deploy and Maintain the Model	Synthesis of design and continuous learning

- Capability Maturity Model (CMM) & Capability Maturity Model Integration (CMMI)
- IMPULS Industrie 4.0 Readiness Model, by VDMA, RWTH Aachen and IW Consult
- Manufacturing Value Modeling Methodology (MVMM), by Gartner Maturity Model
- Industrie 4.0 Maturity Index, by Acatech
- PwC Industry 4.0 – Enabling Digital Operations and Self Assessment;
- BCG – Digital Acceleration Index;
- The Maturity Model for Assessing Industry 4.0 Readiness and Maturity of Manufacturing, by Fraunhofer Austria;
- Minnosphere and Hochschule Neu-Ulm – University of Applied Sciences, online-assessment, digitale readines of companies;
- Federal Ministry for Economic Affairs and Energy Germany (BMWi), Industrie 4.0 – Checkliste: Kommt Industrie 4.0 für unser Unternehmen in Frage;
- Deutscher Industrie-und Handelskammertag (DIHK) – Selbsttest zum digitalen Reifegrad;
- The Connected Enterprise Maturity Model, Rockwell Automation;
- Industry 4.0/Digital Operations Self-Assessment, Pricewaterhouse Coopers.

Maturity levels (Acatech)

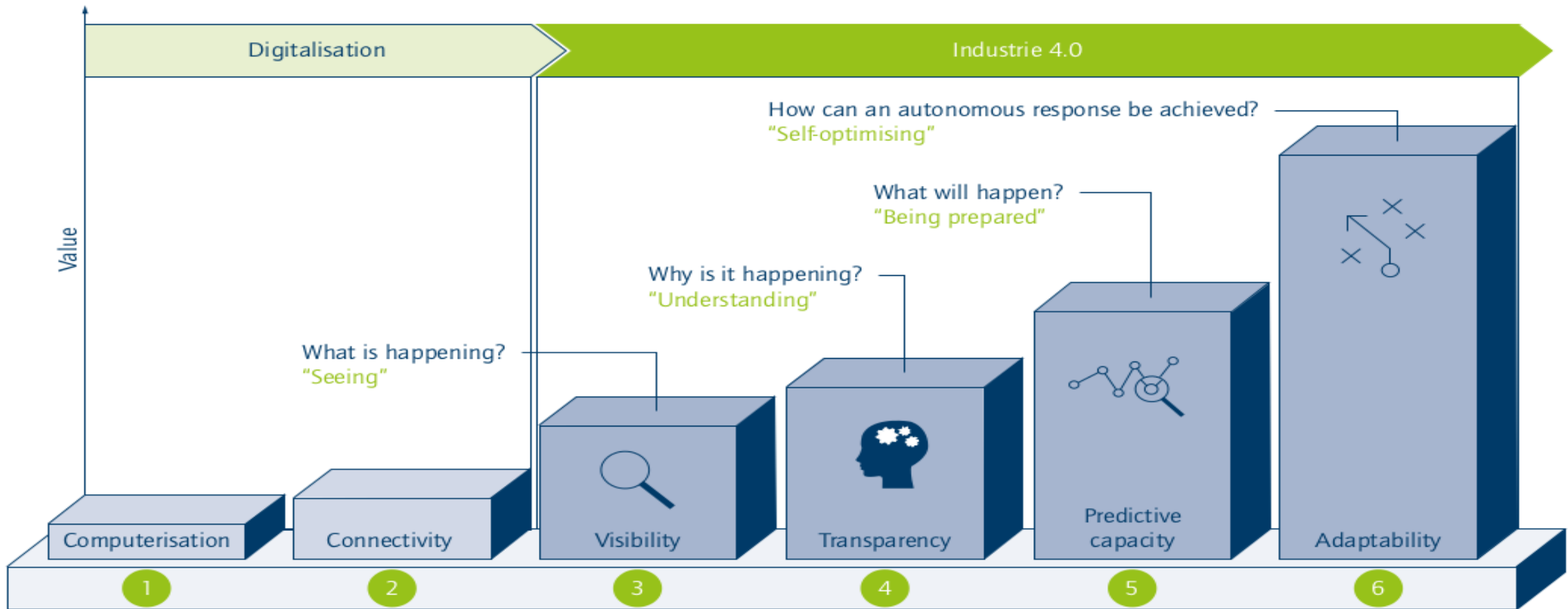
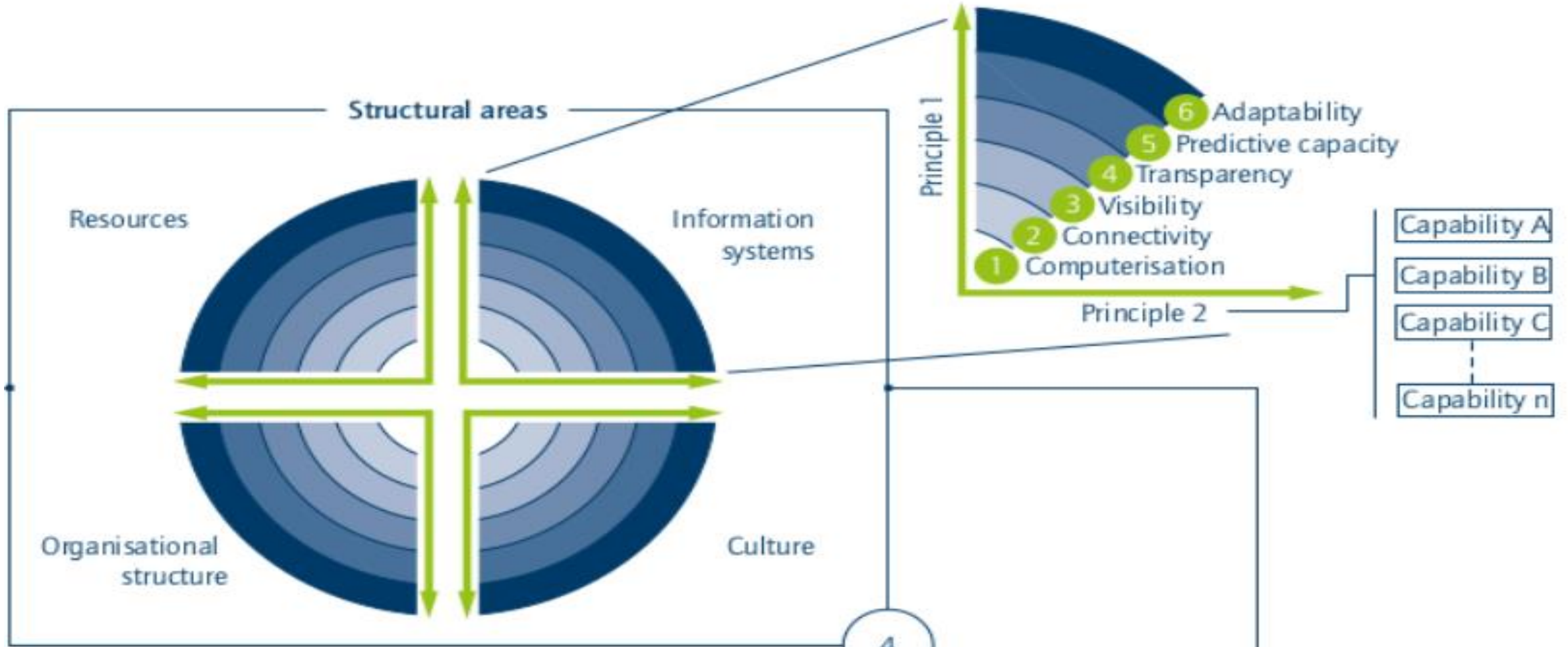
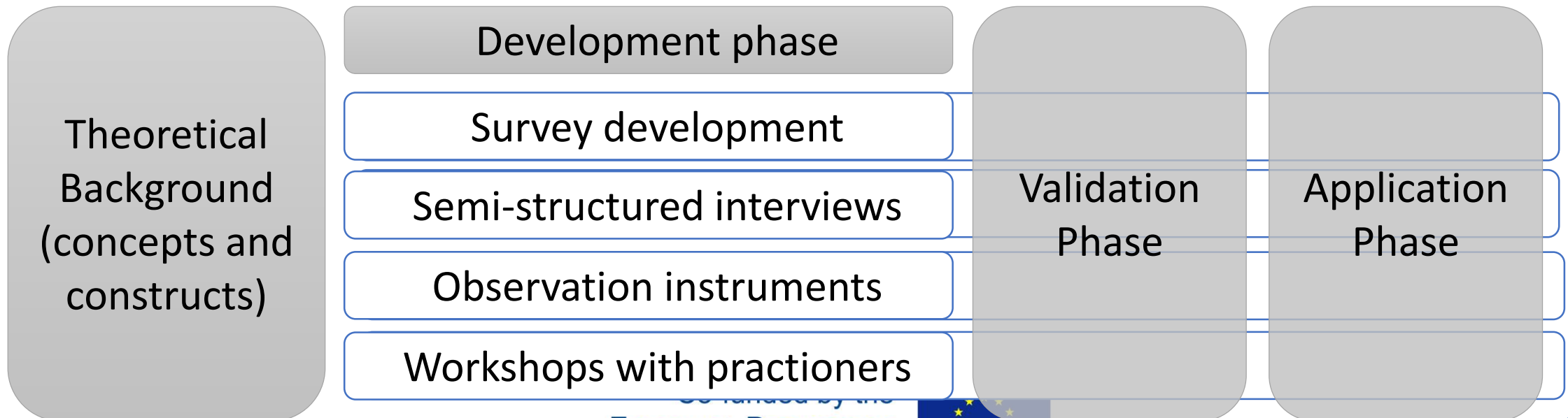


Figure 5: Stages in the Industrie 4.0 development path (source: FIR e. V. at RWTH Aachen University)

Maturity Index (Acatech)





14.0

Company
current state

14.0

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14.0

Companies are
implementing

...

PM

Competences

...

PAEE/ALE'2020 (<http://paeale.ait.ac.th/>)

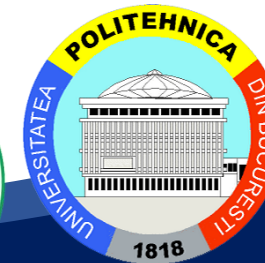
International Conference on Active Learning in Engineering Education
“Striving Engineering Education Towards Student Competence Development”
26th - 28th of August, 2020 in Pattaya, Thailand

MSE 4.0

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Thank You



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