Productive 4.0

Electronics and ICT as enabler for digital industry and optimized supply chain management covering the entire product lifecycle

Short overview

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productive40.eu

The project receives grants from the European H2020 research and innovation programme, ECSEL Joint Undertaking, and National Funding Authorities from 19 involved countries under grant agreement no. GAP-737459 - 999978918.

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Positioning the project

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EC Horizon2020

ECSEL

Electronic Components and Systems for European Leadership

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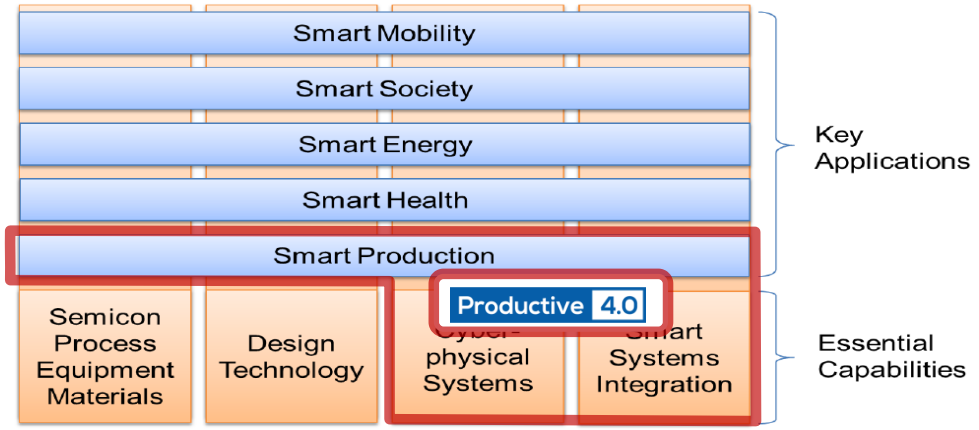

ECSEL Innovation Action & 1st Lighthouse: Industry4.e

Productive 4.0

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ECSEL Lighthouse Industry 4.E

- An umbrella for all Industry Digitalization related activities in the field of Electronic Components and Systems
- A communication platform for all stakeholders facilitating the cooperation and reducing fragmentation.
- A link towards the respective national and regional activities in the field
- A social impact and uptake accelerator of project results.
- A powerful channel towards specialized and general public.

Scope of the project

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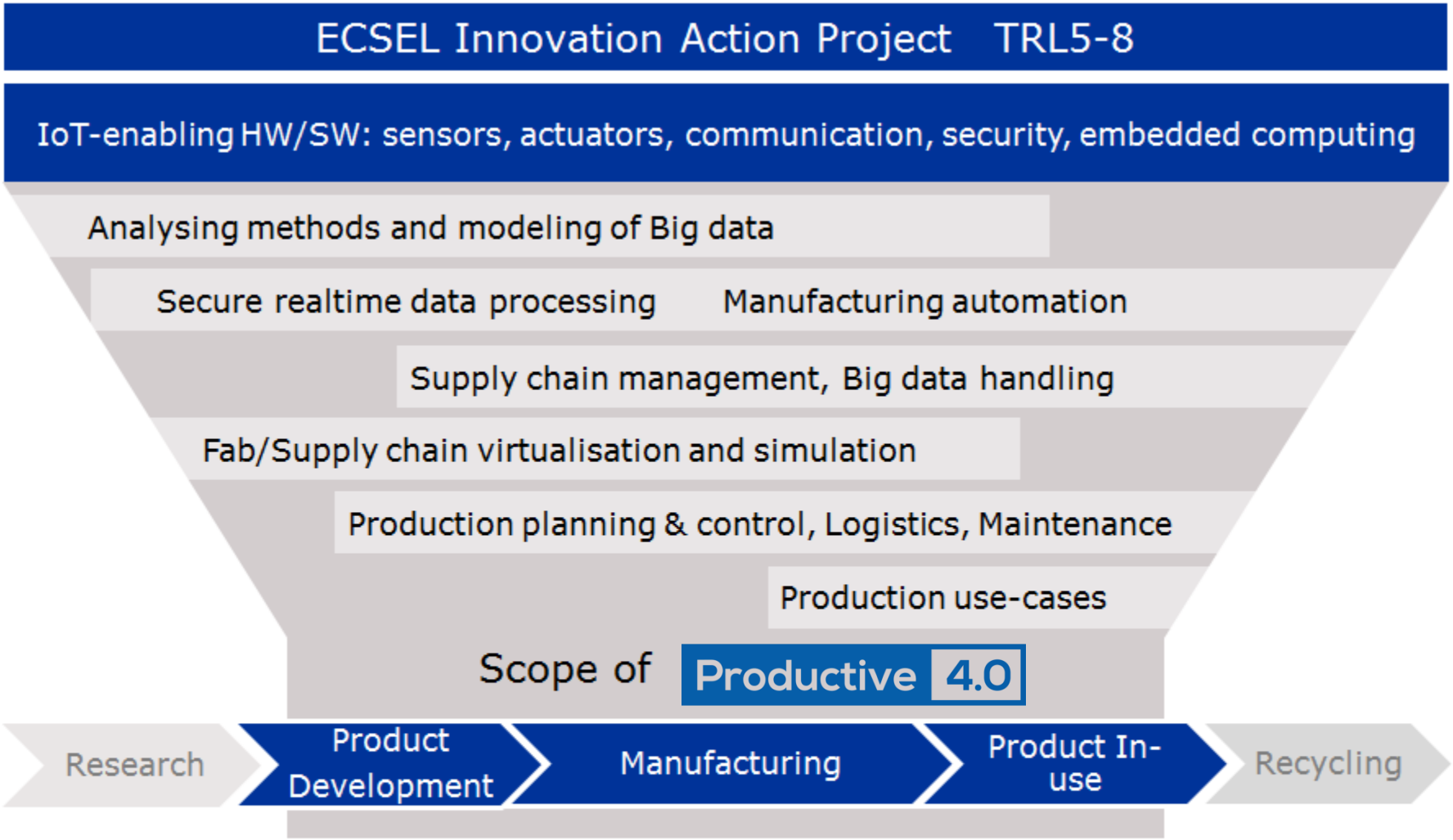
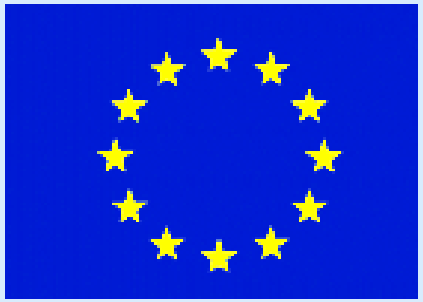


Main objective of the project



Significant improvement in digitalising the European industry by means of electronics and ICT.

- aiming at suitability for everyday application
- various industrial domains with same approach of digitalisation.

- Key partners:

  BMW, Philips, Infineon, ABB, NXP, STM, BOSCH, Thales, AVL, VOLVO, CEA, BetterSolutions, IMA, KIT, AIT, FhG, Sysgo, DANOBAT, MONDRAGON, ERICSSON, VTT, SINTEF, LTU, LFOUNDRY ,TNO, TTTech, Siltronic, VIF and many more..

- Key industrial domains:

  Automotive,
  Machinery,
  Robotics,
  Semiconductor & Electronics,
  Consumer,
  Automation,
  Logistics

..a structured European consortium indeed..

- 109 Partners
- 19 countries
- 65% Industry
- Budget: 106 Mio €
- JU funding: 26 Mio €
- Total grants: 51Mio €

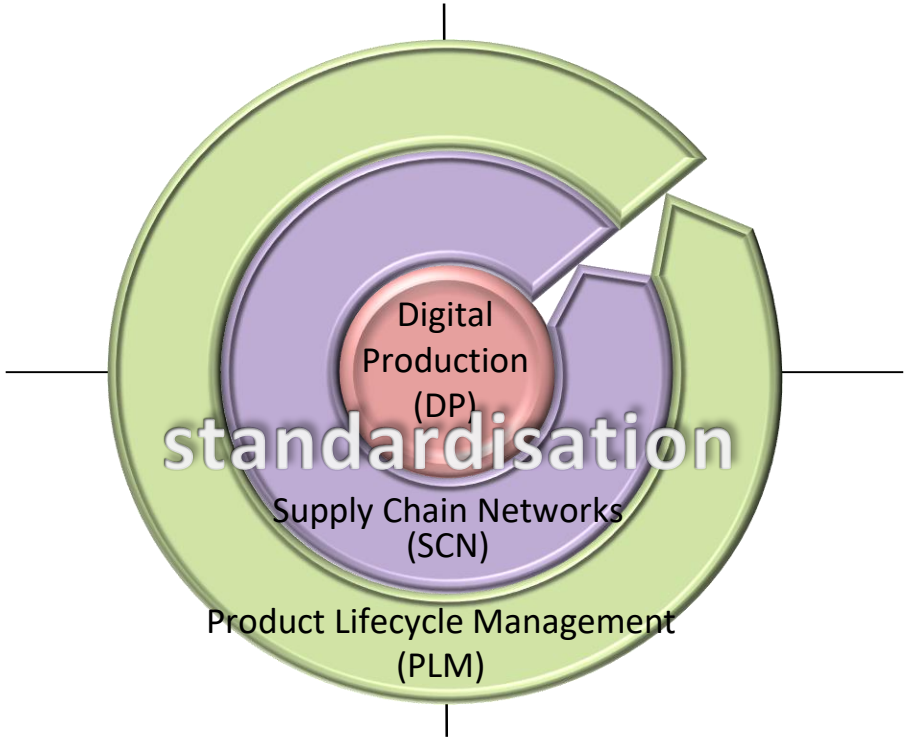
- Well balanced across ECSEL communities:
  - 45% AENEAS
  - 30% ARTEMIS-IA
  - 25% EPOSS

approx. 65% HW electronics; 35% system architecture, methods and tools

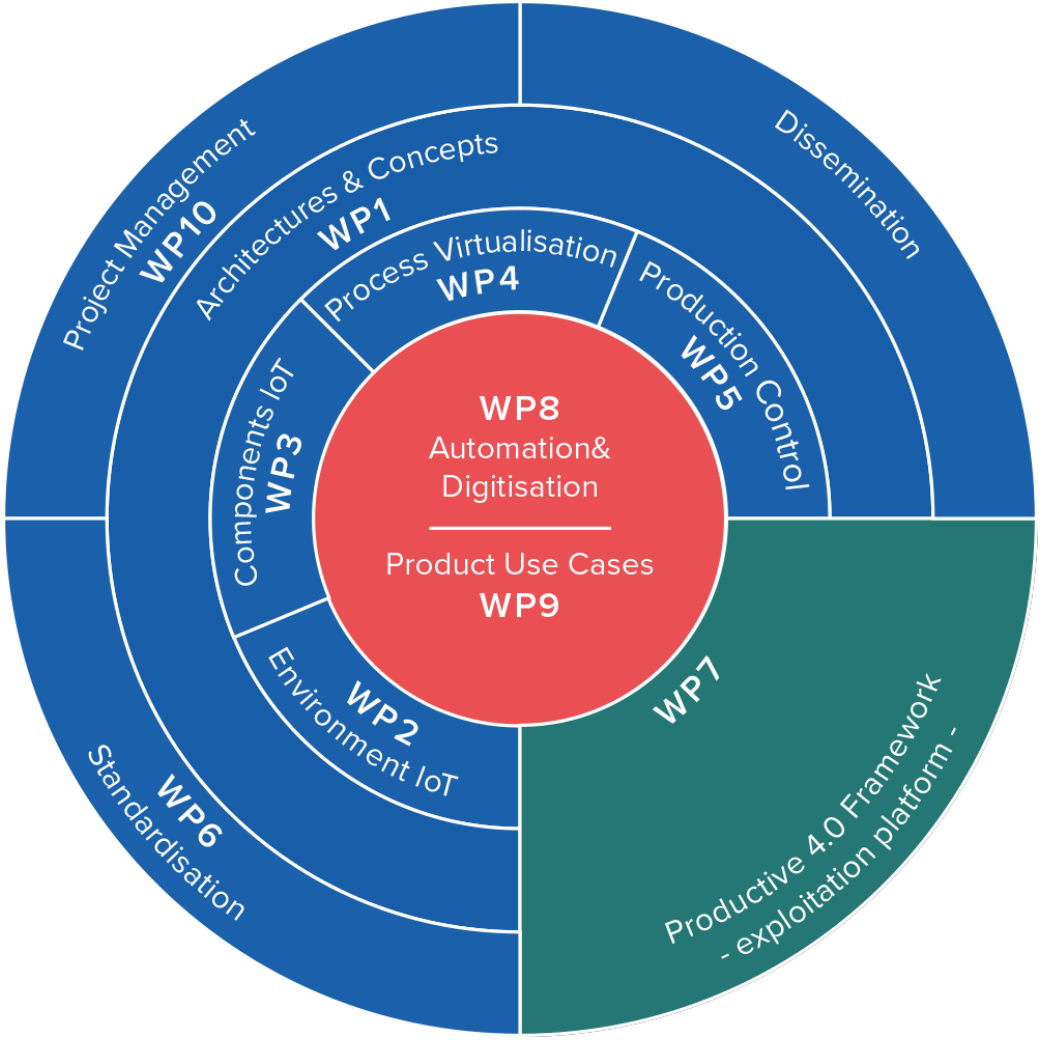
Basic approach

Productive 4.0 a hands-on approach of digitalising the European industry with focus on the three pillars:

- Digital production (DP)
- Supply Chain Networks (SCN)
- Product Life Cycle Management (PLM)



Project Structure – towards reference implementations



Project Structure ..relevant objectives per work package

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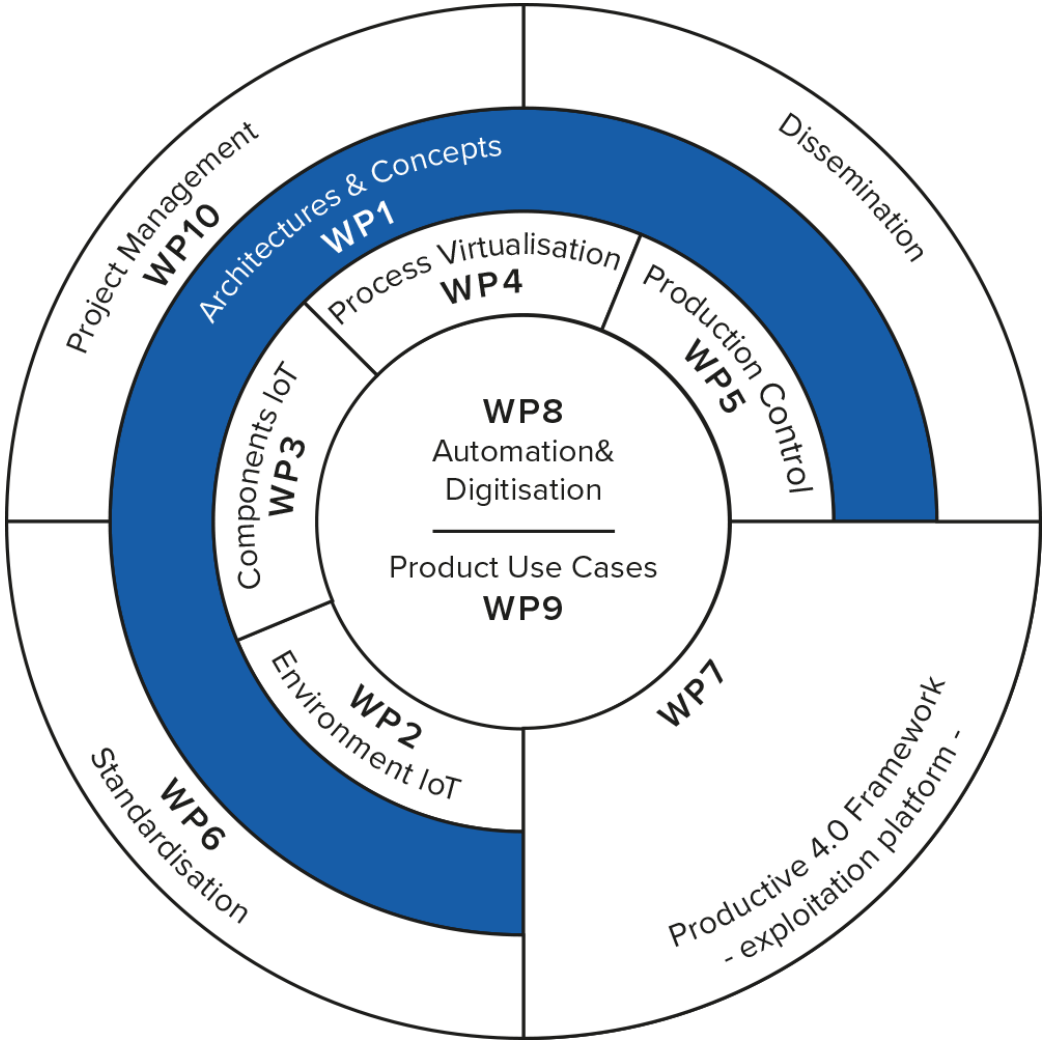
1) Furnish the Digital Industry with SoS-based architecture platforms



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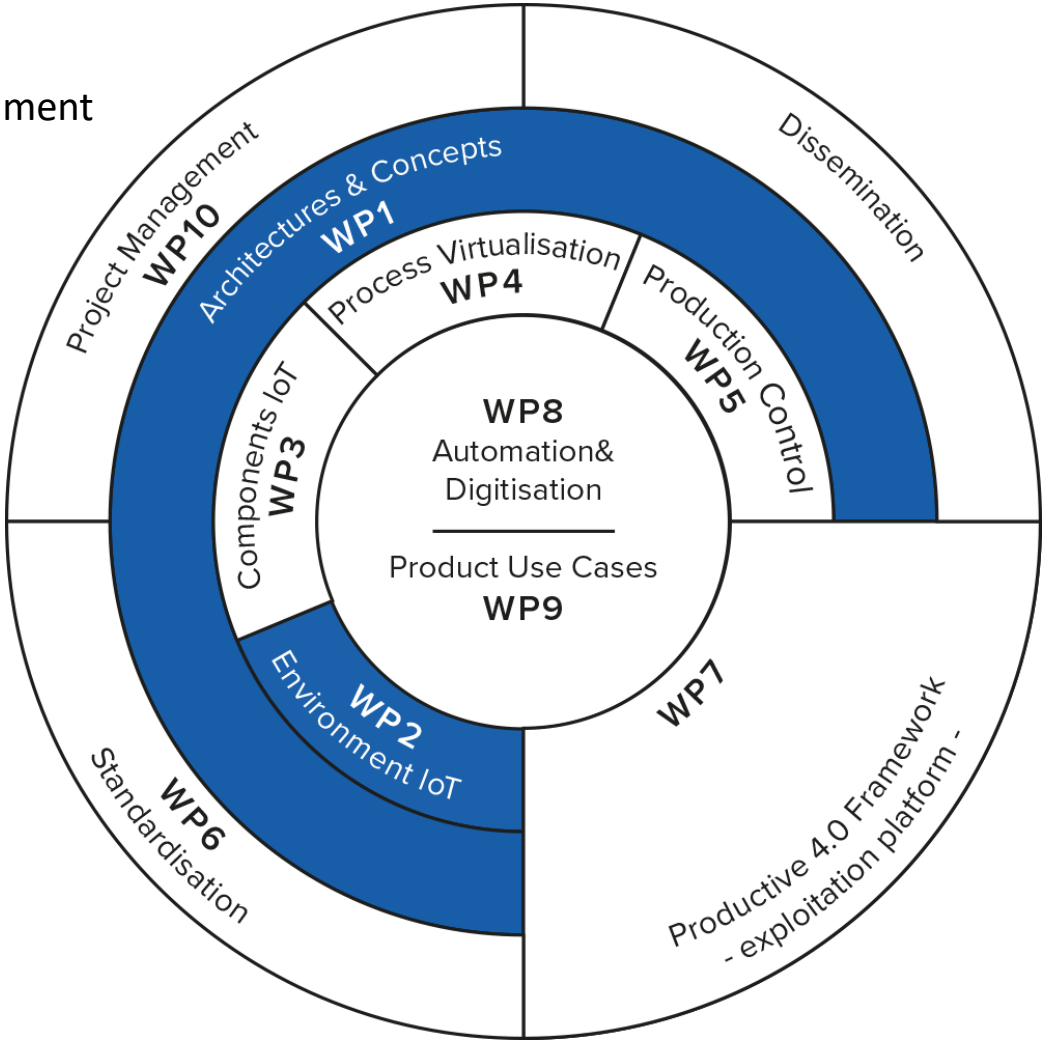
Project Structure

1) Furnish the Digital Industry with SoS-based architecture platforms

2) Set up a data analytics framework and a secure communication environment

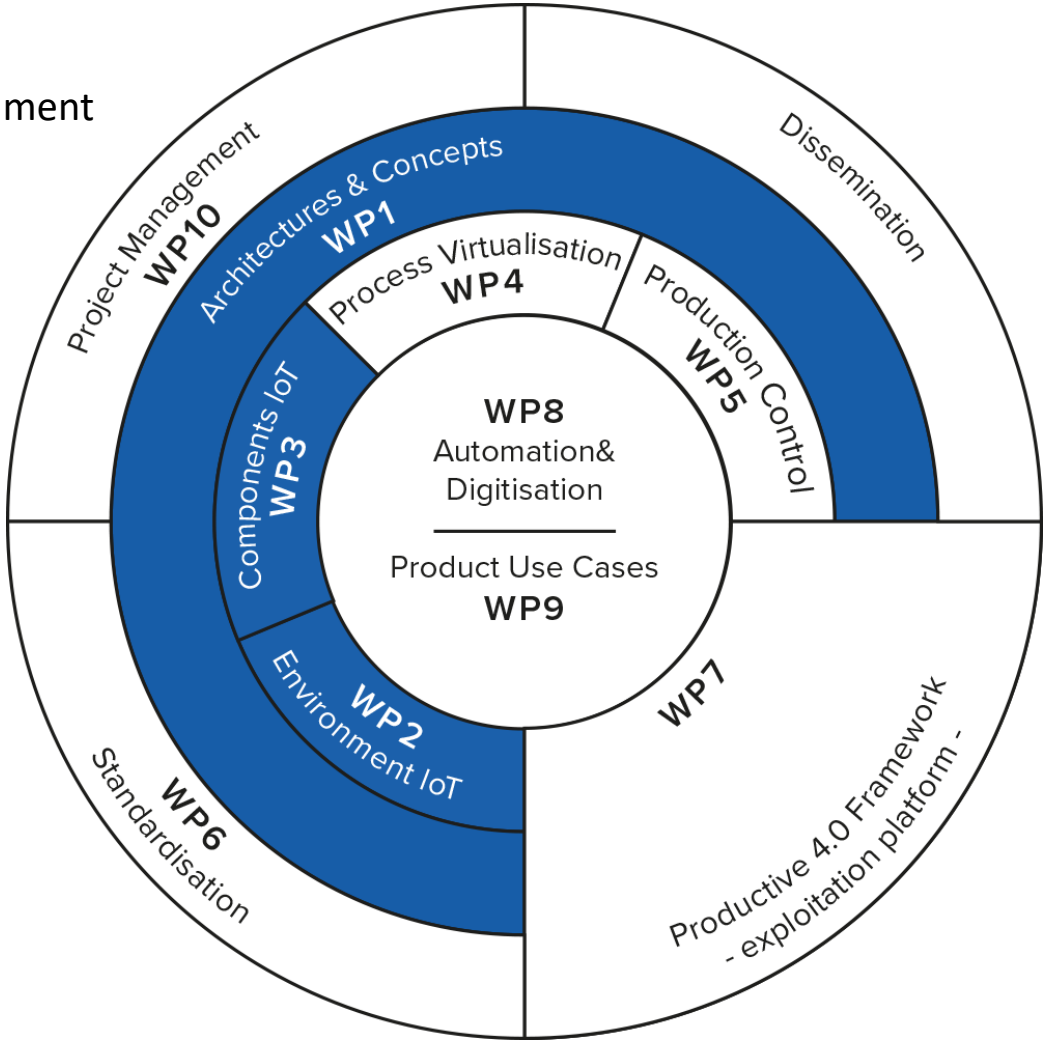


Project Structure

1) Furnish the Digital Industry with SoS-based architecture platforms

2) Set up a data analytics framework and a secure communication environment

3) Provide the industry with IoT-enabling components



Project Structure

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2) Set up a data analytics framework and a secure communication environment
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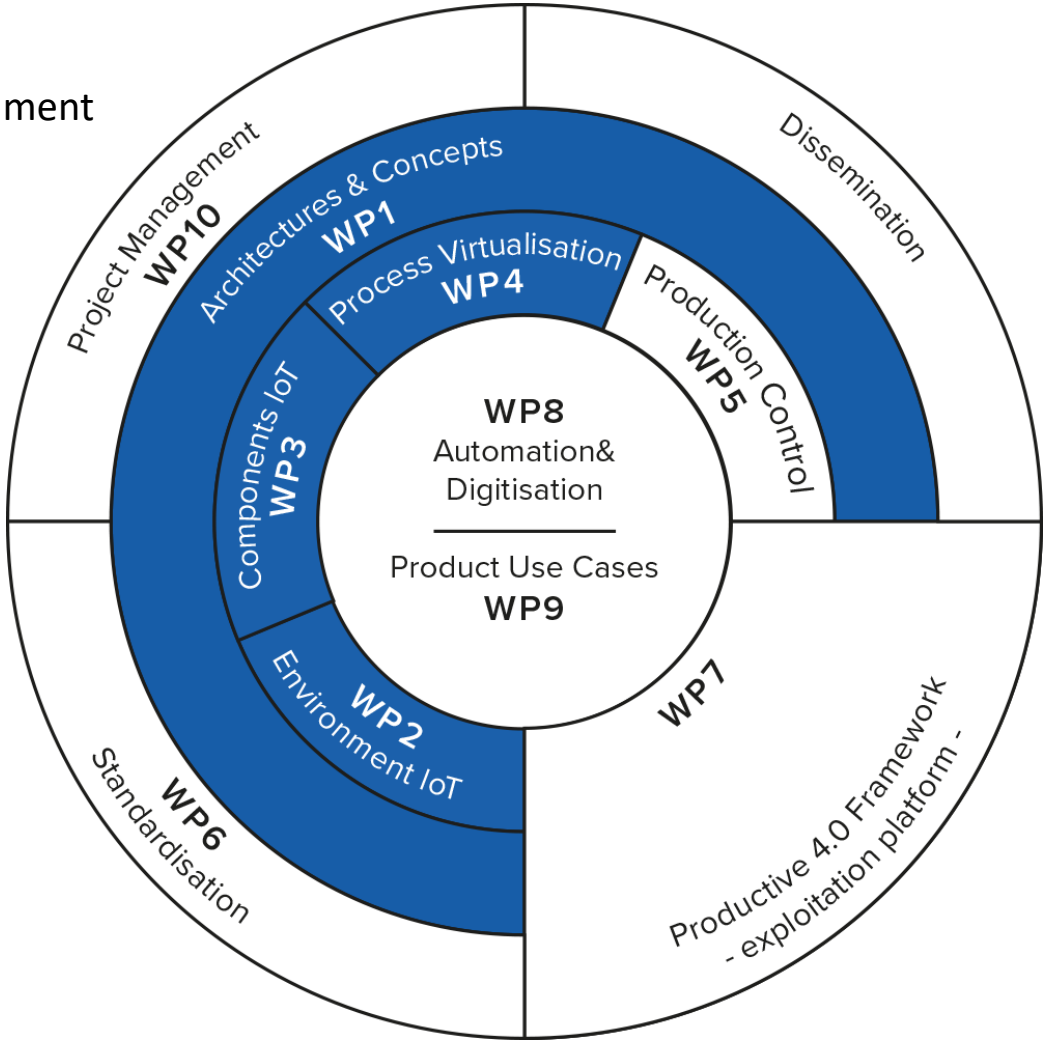
4) Develop complex simulation models for DP, SCN and PLM



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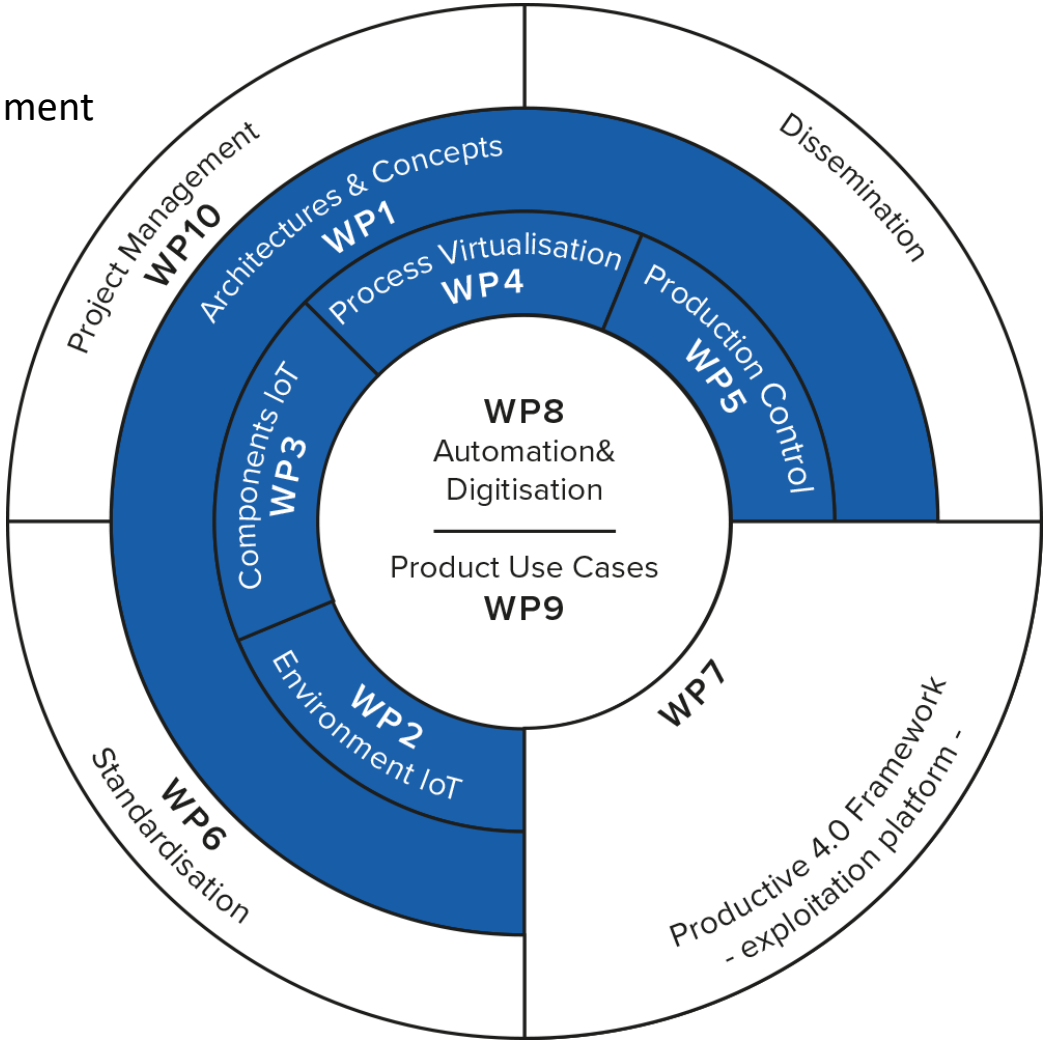

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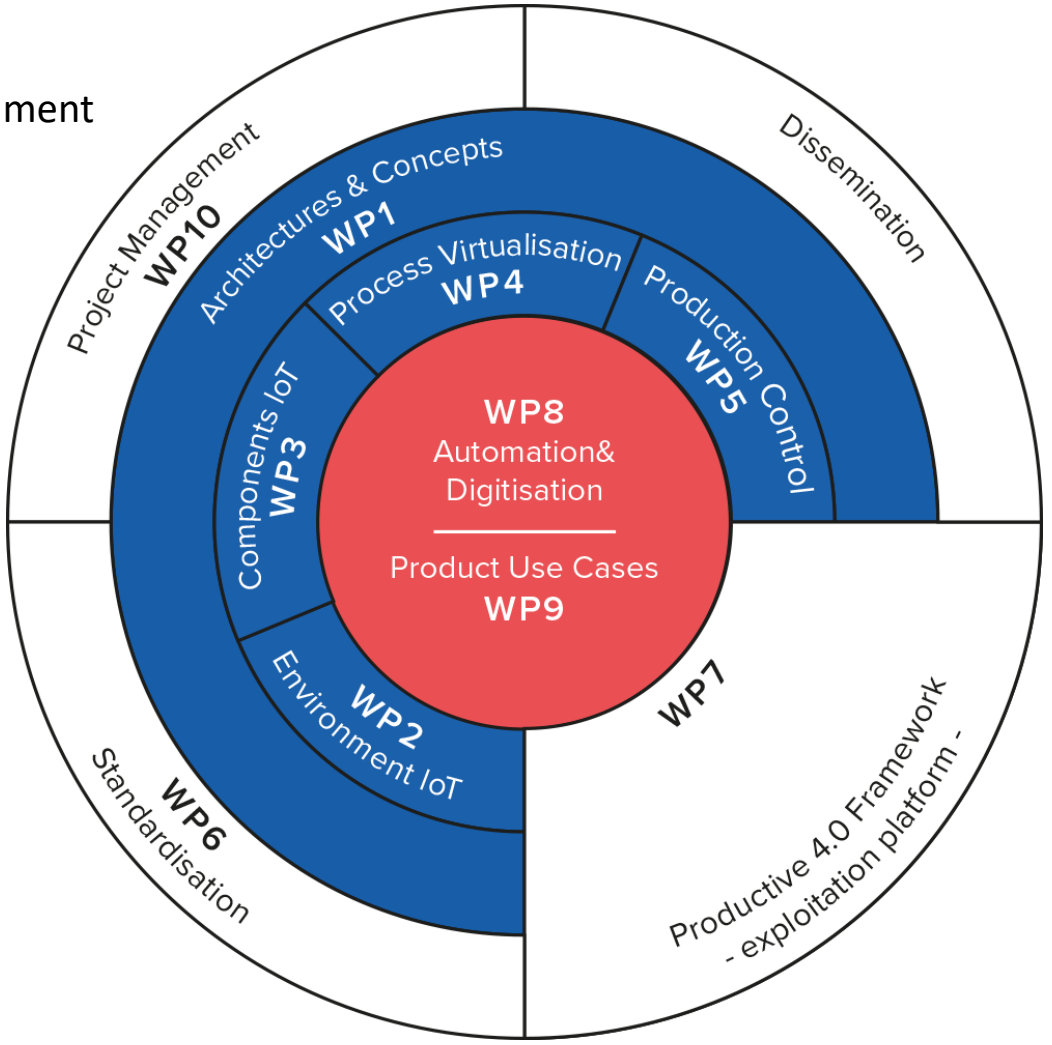

8) Provide for practical solutions and reference implementations for the Digital Industry

9) Implementation of reference product use cases for the different industrial domains

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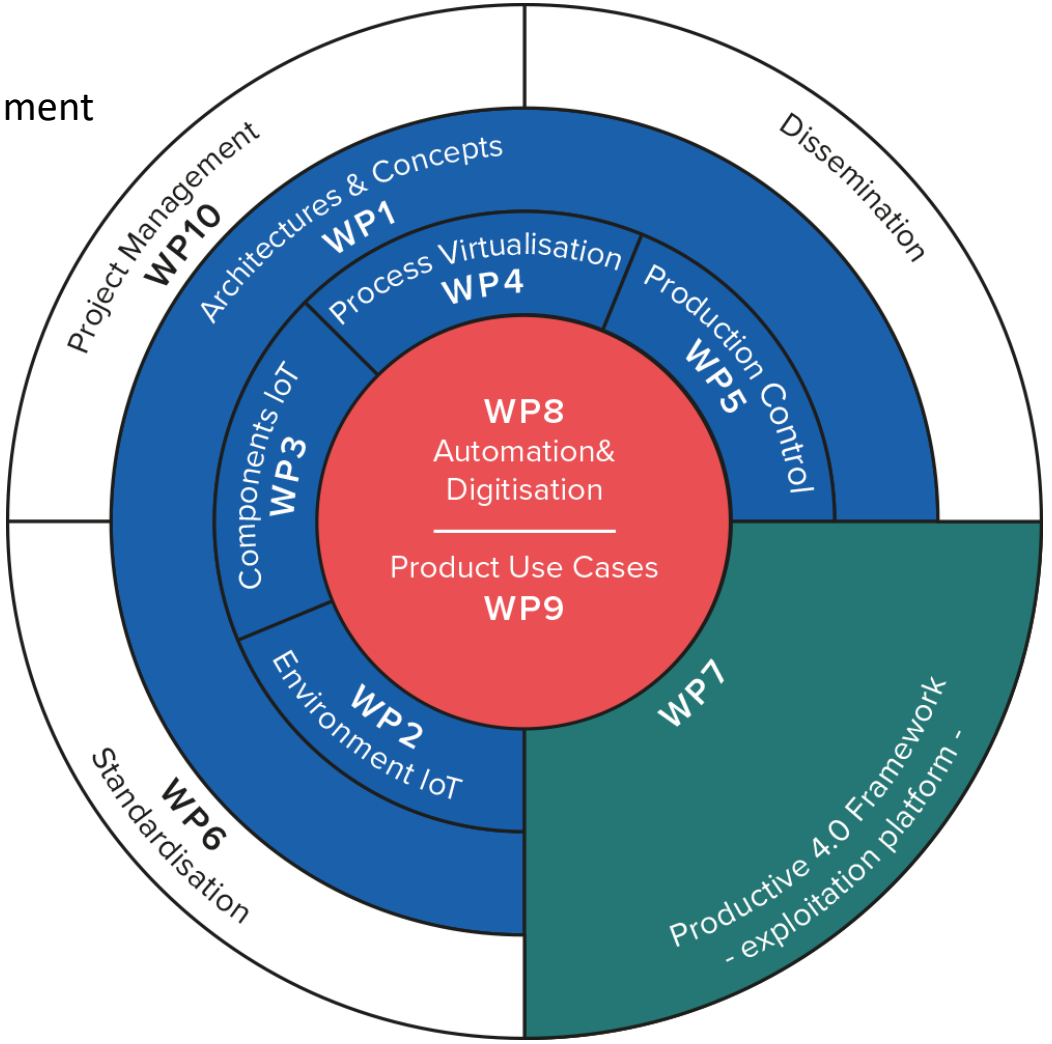
7) Establish the Productive4.0 framework as a cross domain platform for the Digital Industry
8) Provide for practical solutions and reference implementations for the Digital Industry
9) Implementation of reference product use cases for the different industrial domains



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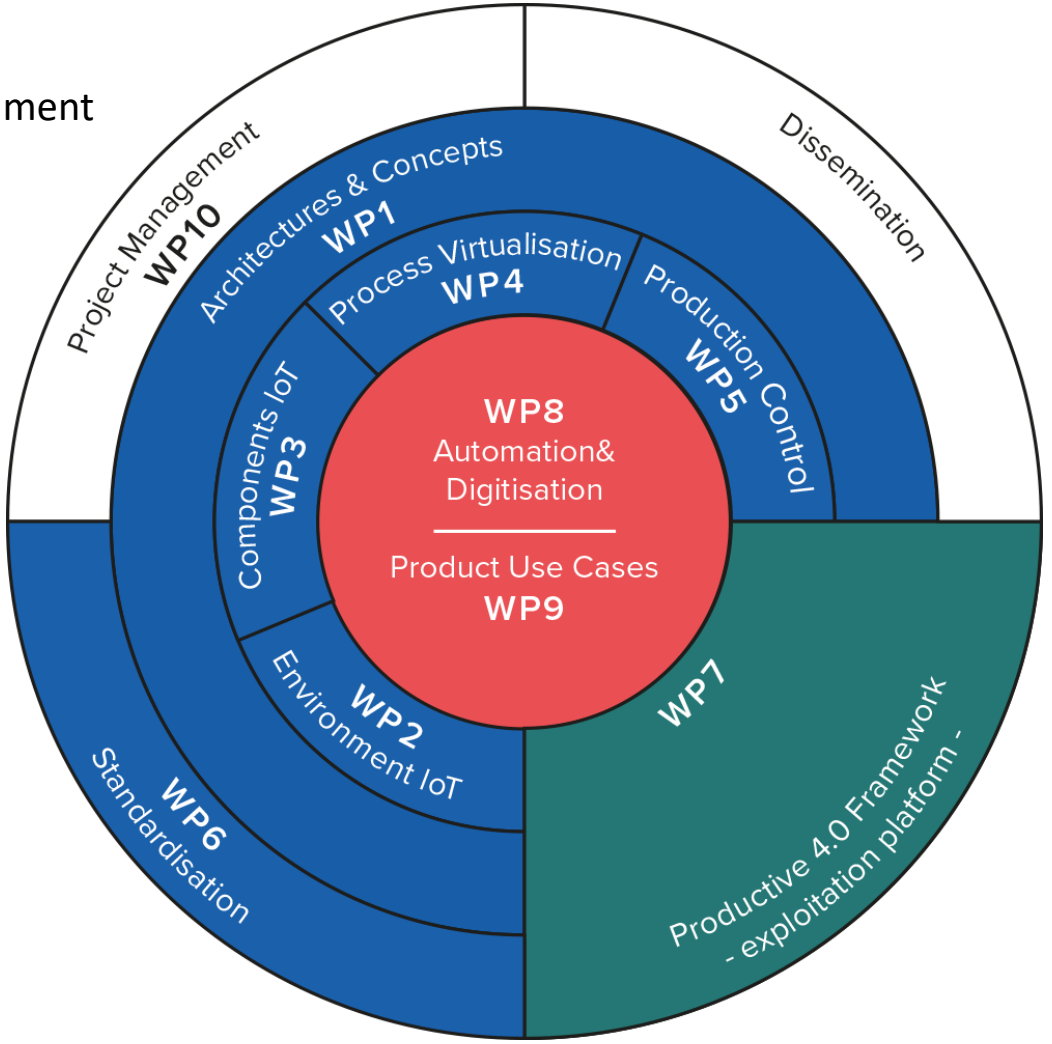

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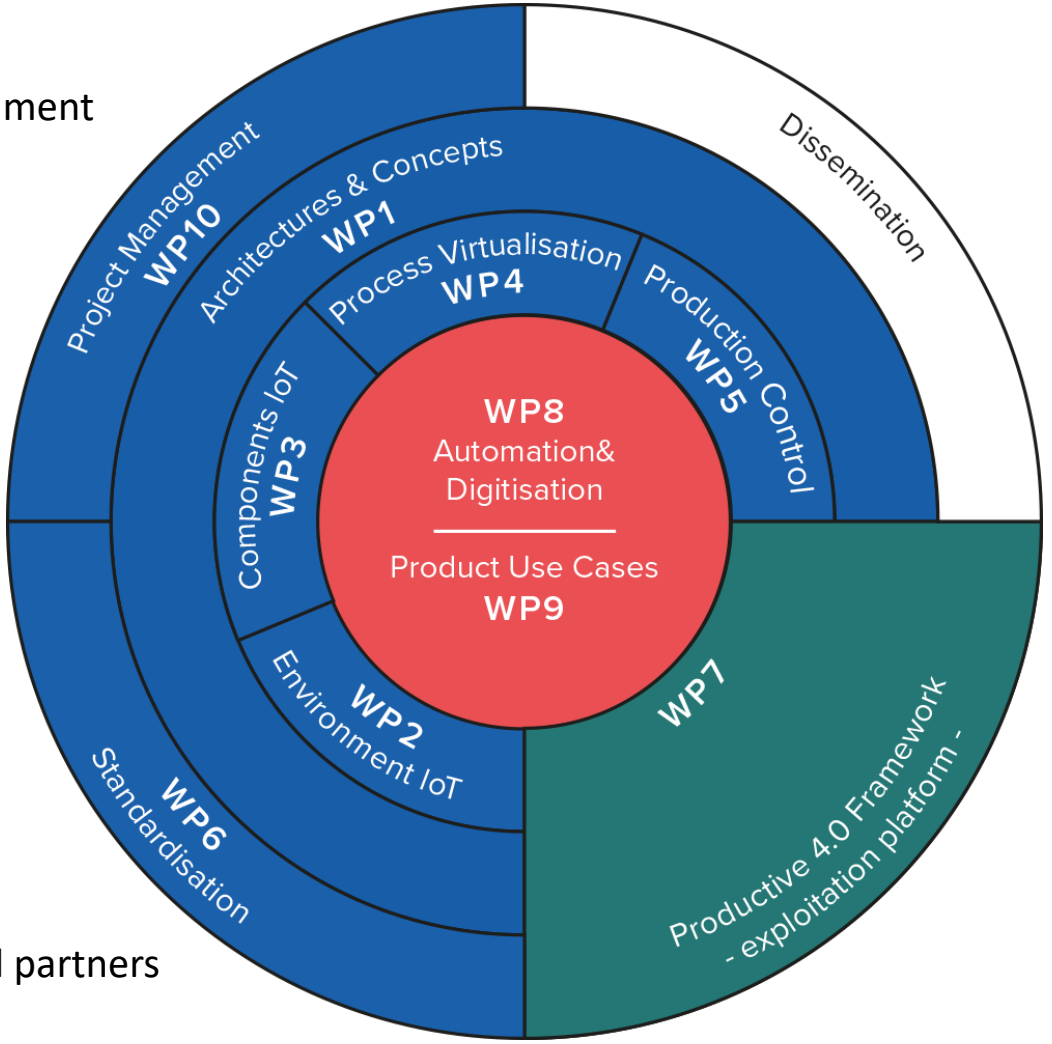
10) Establish an appropriate environment for the Productive4.0 brain pool partners



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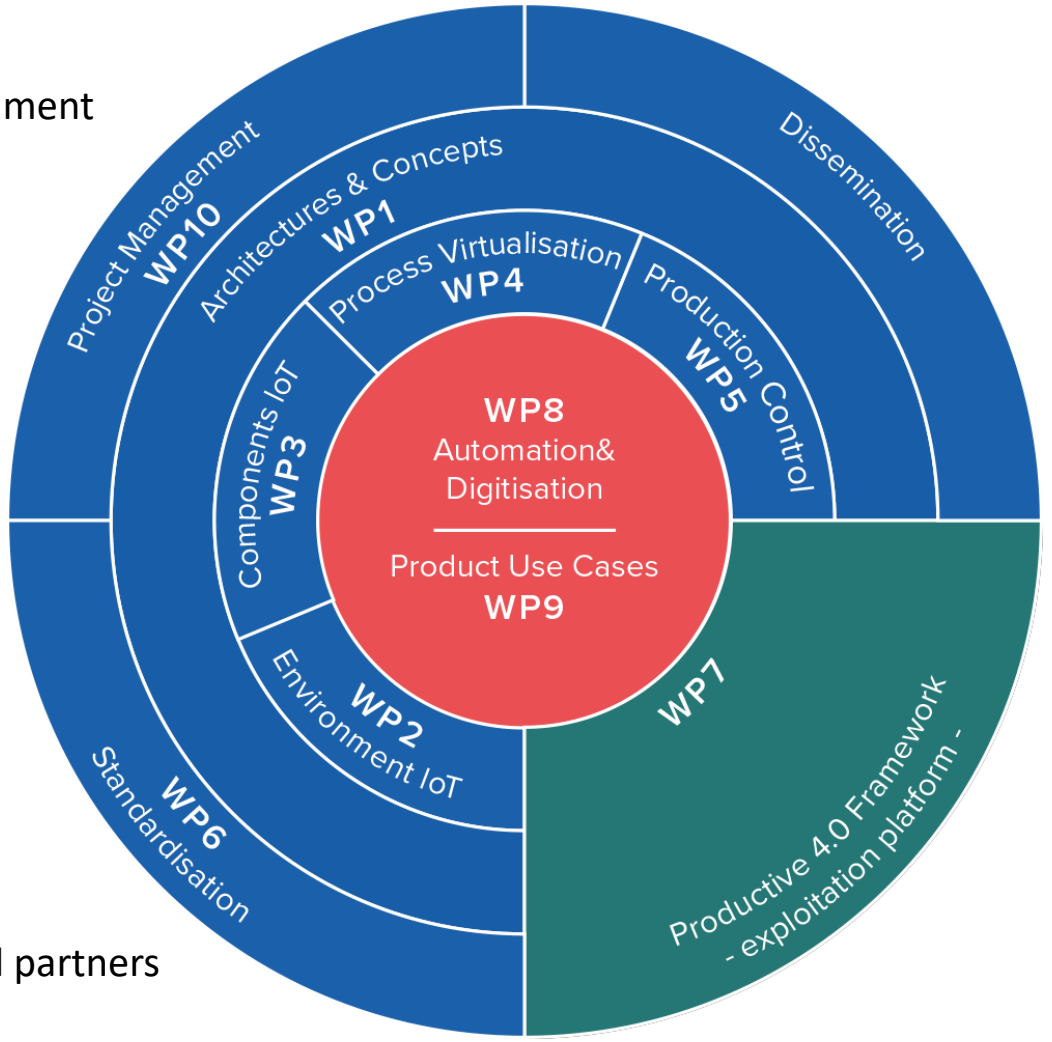

Project Management
Overview

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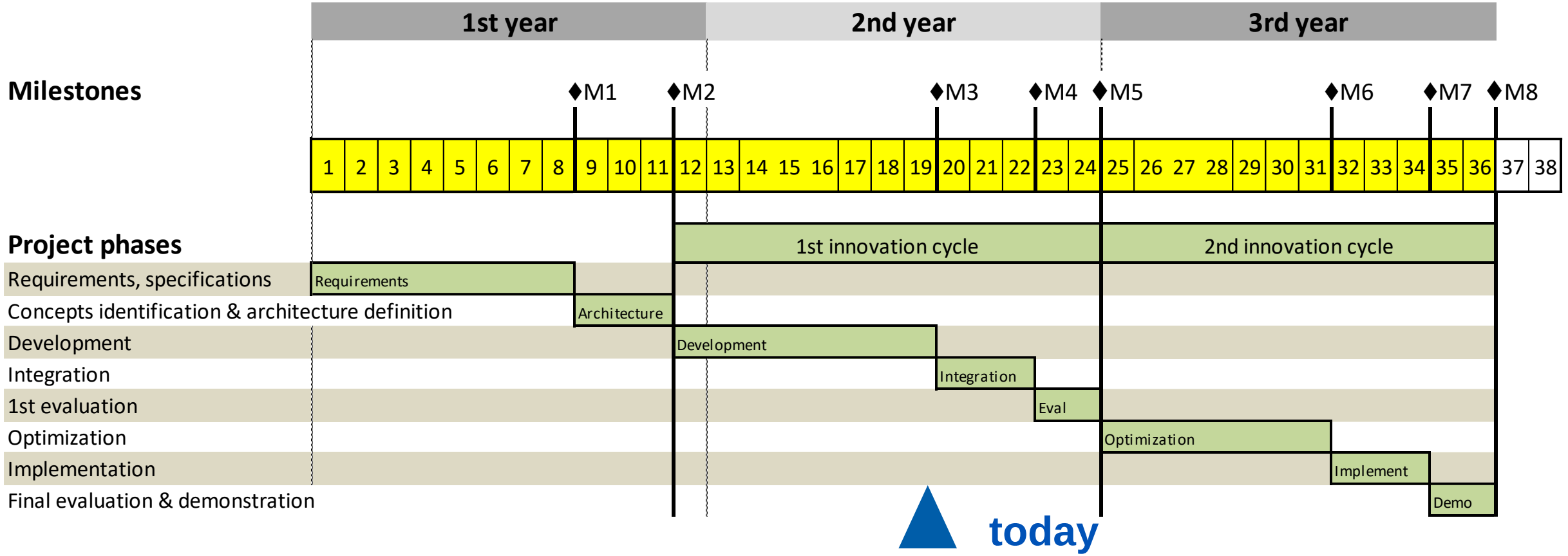
Project Phases and Major Project Milestones



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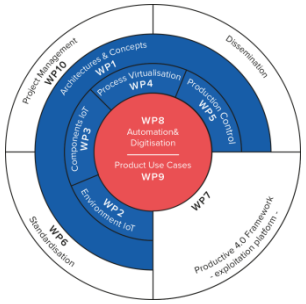

Automation and Digitisation Pilot Lines

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WP8
Tier3 Pilot Lines

WP8
Tier2 Pilot Lines

WP8
Tier1 Pilot Lines

WP8
OEM Pilot Lines

WP9 Product - Use case1

WP9 Product –Use case2

WP9 Product – Use case x

Automotive
(e.g.BMW)

Shaver
(e.g. Philips)

Machinery
(e.g.Danobat)

Tools/
Materials

Semi

System

OEM

Supply Chain Networks

Automation and Digitisation Pilot Lines

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OEM use cases:

x4

- Integration of vehicle individualization in a highly automated assembling process in the Automotive Industry in the logistics based on Product Lifecycle Management Systems (BMW, EDMS)
- Flying robots (BMW, VZMT, KINEXON, FAU FAPS)
- Industrial IoT/CPS system (VTC, ERICSSON, LTU, SEB)
- Tracking, sensing and actuating services (IMA)

Tier2 Use Cases

x16

- MES of the future (IFD, SYSTEMA)
- High Automation Solution in SC Wafer production line (Siltronic, SYSTEMA)
- Data Analytics, Semiconductor Data Lake (SYSTEMA, IFD)
- Fab robotization (ST ROUSSET)
- Factory Supervision for variability reduction (ST CROLLES)
- Adaptive mobile robotic systems for Smart manufacturing (HOST, IFD)
- Smart Semiconductor Production Automation by Flexible Autonomous Robots with Advanced Handling Functionality (FRAUNHOFER IFD, FEAG)
- Smart, adaptive and intelligent substrate handling (IFD, ZS-Handling, Xenon, HOST)
- Automation frame work for new equipment without automation standards (IFD, Xenon)
- Automation frame work and automation strategies for advanced carrier cleaning procedures for semiconductor substrates (IFD, Pfeiffer-Vacuum, FhG IISB)
- Real-time based, Global and Local production Optimizations “RIGLOS”, (SYSTEMA, Infineon)
- Optimization network using advanced scheduling (IFD, TUD)
- Modern outlier detection methods for semiconductor manufacturing (IFD, TUD)
- Management of Automated Fab Control, Tasks and Decisions (IFD)
- People in a 4.0 digitalized manufacturing area (Change Management) (IFD)
- Single device tracking and advanced process control in assembly and packaging for system integration (IFAG)

Tier1 Use Cases

x5

- Smart services for test equipment (AVL)
- Simultaneous Cost Engineering for powertrain architectures (AVL)
- Smart Services for Trusted
- Manufacturing Site (AVL)
- Supply chain management for semiconductor manufacturing (BOSCH)
- Smart failure analysis lab (IFAT)

Use cases along the supply chain

x8

- Shaver system use case (PCL)
- Extended Product Lifecycle Management Best Practice (Thales NL)
- Machine tool digitization (DANOBAT,MONDRAGON,IDEKO,SAVVY,ULMA,MGEP)
- Chemical production (Infineon, Sidiktor, HIOF, TellU, SINTEF)
- Camshaft Proactive Manufacturing (EPC, Innovalia, TRIMEK, TTT, MGEP, TUW, AIT)
- Machine and fleet management offered as industrial services (VTT, TUT, WAPICE, CC, Metso, Konecranes)
- Virtual production planning and control of a semiconductor supply chain at Bosch (BOSCH)
- Digital Production of ETO Luminaires (PLV)

33 Use cases

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OEM use case: flying robot

The flying robot is Developed by IEMTEC, Kinexon and University of Erlangen-Nuremberg FAPS, it is subject of a use case together with the car manufacturer BMW Group in work package 8.

- Diameter one meter, can carry a payload of up to 13 kg
- positioning in an indoor area is the challenge and first flights have been successfully performed

Result form Supply chain management

easy to use online finder tool for comparing semiconductor products in an application context visualized by block diagrams and combined with simulation.

Prepared for 10,000 semiconductor products

https://solutionfinder.infineon.com/application/en

Thin wafer Handling / Robotics

Tier2 Use Case

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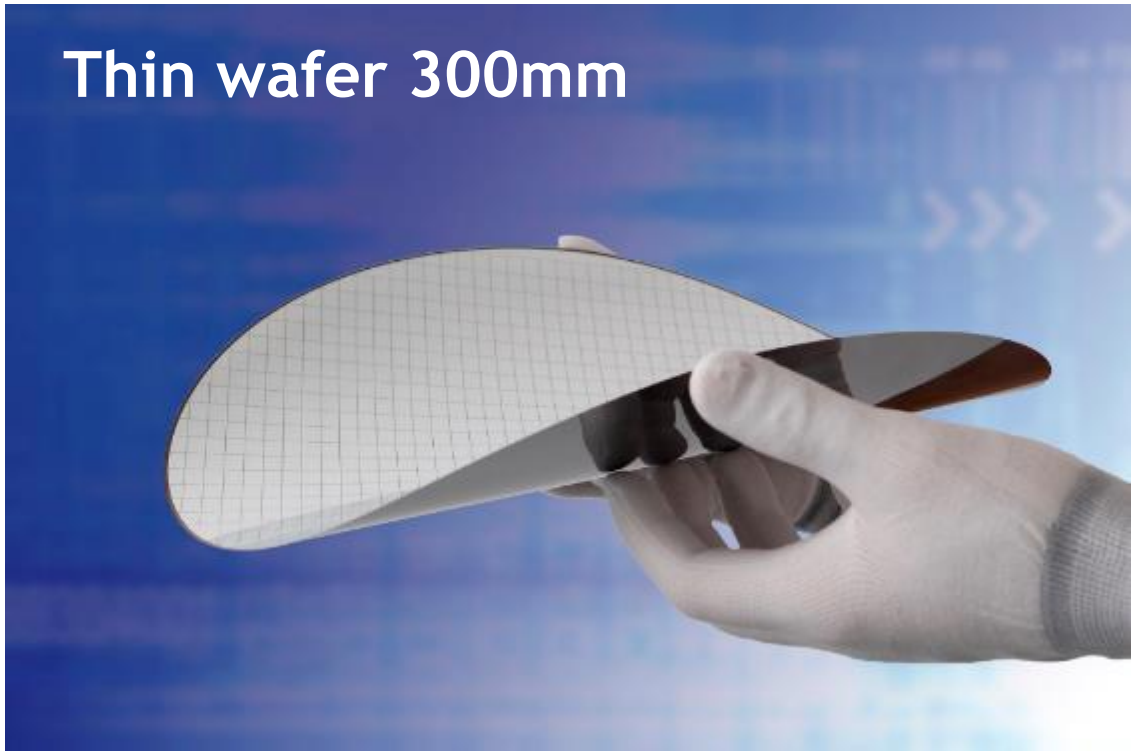
- **Content of the UseCase**
  - Enabling semiconductor manufacturing for new substrate types assuring stable production
  - Realization of automation frame and integration of smart handling especially for critical substances with different wafer thickness
- **Technological need for thin wafer**
  - Thinner Wafer reduces on state losses (static and dynamic) for IGBT → need for thinning
  - Front and backside of the wafer are electrical active → no damage on the surfaces aloud



More results:

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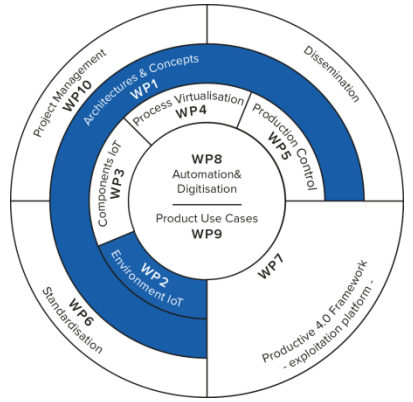
WP2 Environment for Digital Industry



T2.1 Interaction with other work packages

T2.2 Data Analytics and Handling services

T2.3 Secure Communication networks

T2.4 Data security

Security is protecting essential values

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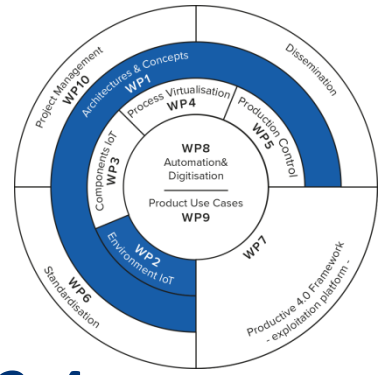

T2.4

Espionage/Fraud

Know-how and R&D investments

Competitive loss

Sabotage / Cyber War

Physical damage

Financial liabilities

Reputational impact

Selected security use cases

Anti-counterfeiting

Intellectual Property (IP) protection and feature activation

Remote maintenance

T2.3

Infrastructure security

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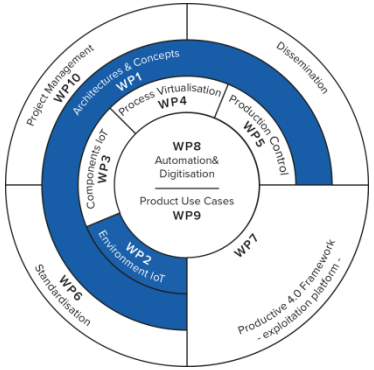
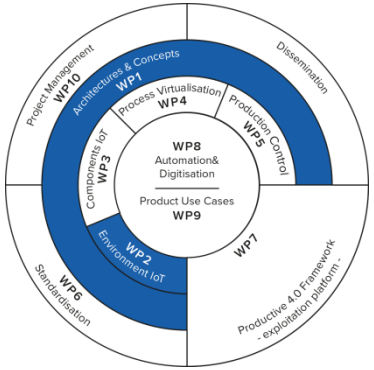
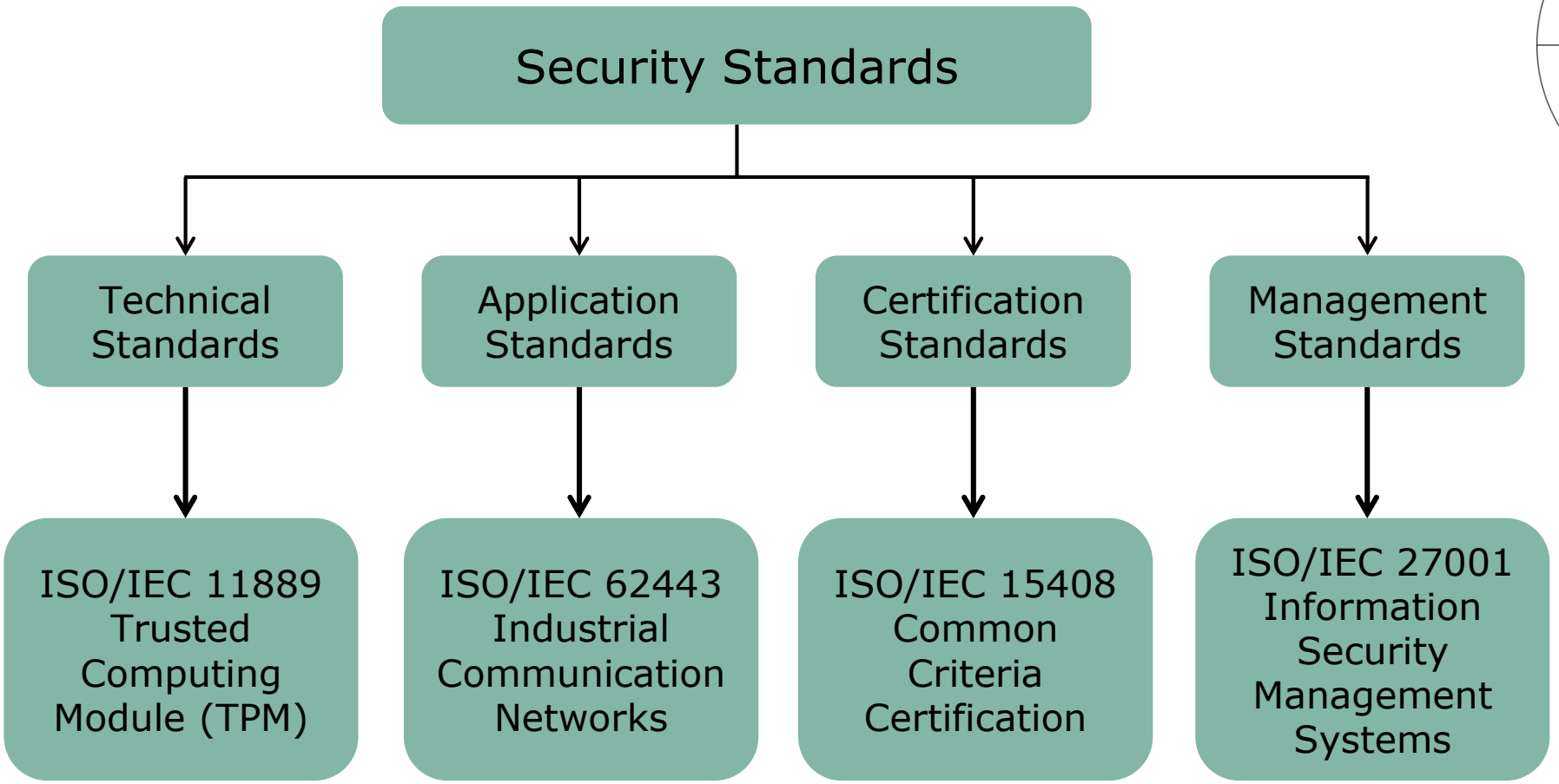
Basic functions and security targets



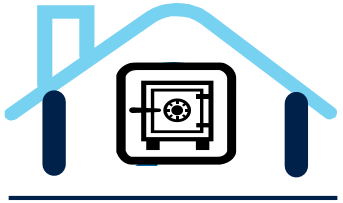
Main target	Security target	Security basic function
› Physical & logical separation of LAN, WLAN, other networks	› Confidentiality › Integrity › Availability › Verifiability › Legal certainty	› Secure Authentication › Authorisation › Encrypted › Data transfer
T2.3	T2.3 / T2.4	T2.3

International Security Standards

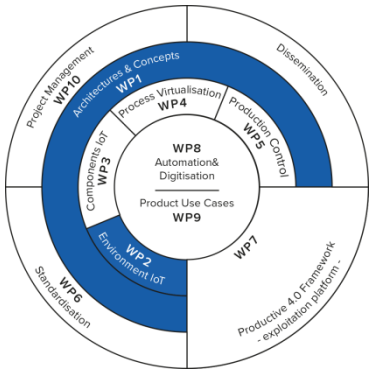




Comparing hardware & software-based trust anchors



	Main CPU + SW	Main CPU + HW
Crypto functionality	✓	✓
Strong isolation	STOP	✓
Security certification	STOP	✓
Tamper proof	STOP	✓
Manufacturer using security certified processes	STOP	✓
Personalized security certified processes	STOP	✓



Security processes determine security quality

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T2.3

- Threat and attack **scenario** analysis
- Security **objectives** and measurement

- Security-certified **production**
- Secured **personalization**

T2.3

Security hardware & software **architecture** expertise

Security

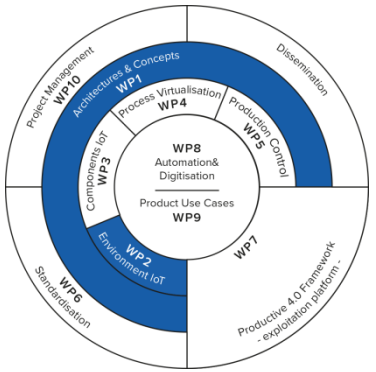
The result of processes

Portfolio of security certified trust anchors

T2.3

Secured design and **development** environments

Security Lab for security penetration **testing**



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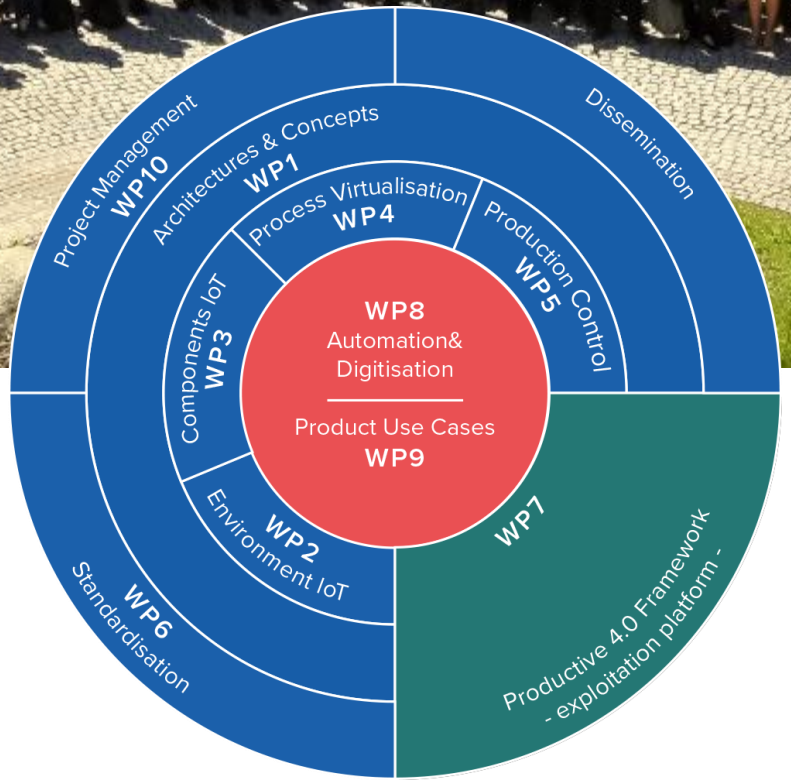

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Consortium at the kickoff 18 May 2017, Dresden

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Thank you very much for your kind attention!

Thomas Gutt

Co-ordinator Productive4.0

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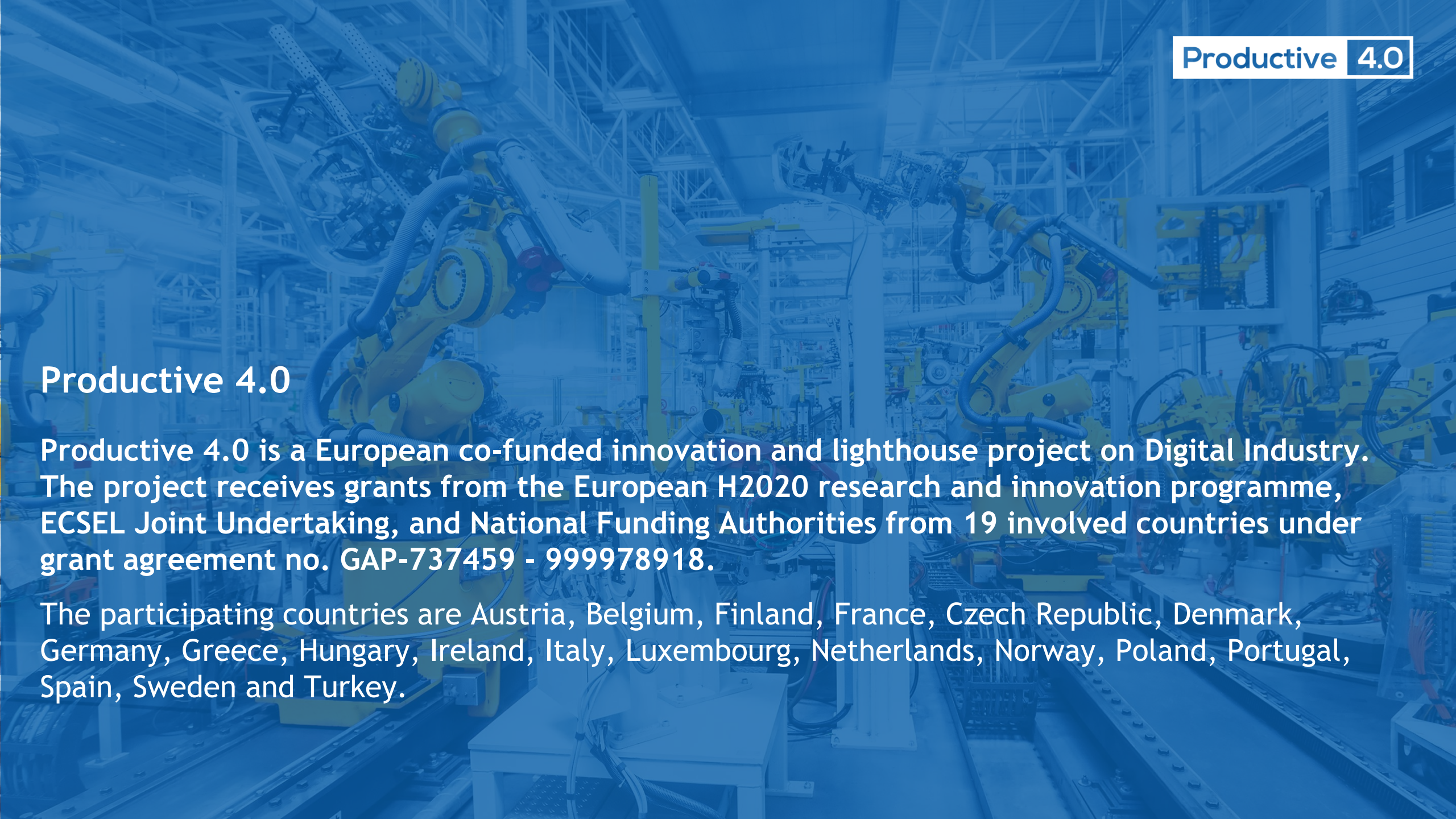
The participating countries are Austria, Belgium, Finland, France, Czech Republic, Denmark, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Spain, Sweden and Turkey.



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CONSUMER & FINANCE
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