INTERNET OF THINGS E INDUSTRIA 4.0: strategie per la competitività

IOT nell'Industria Manifatturiera 4.0: sfide ed opportunità

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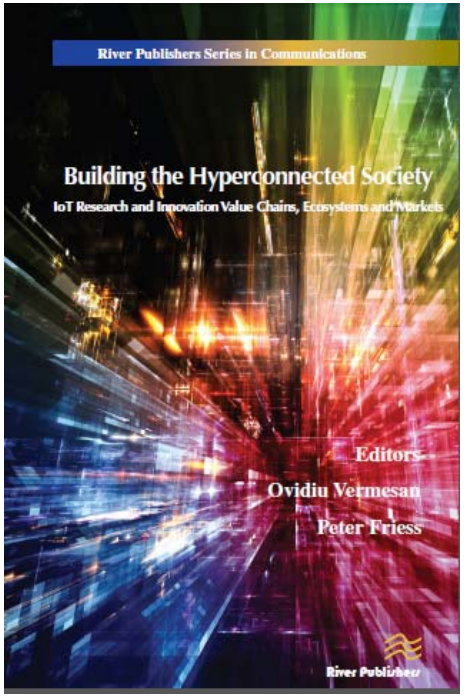
Who am I?

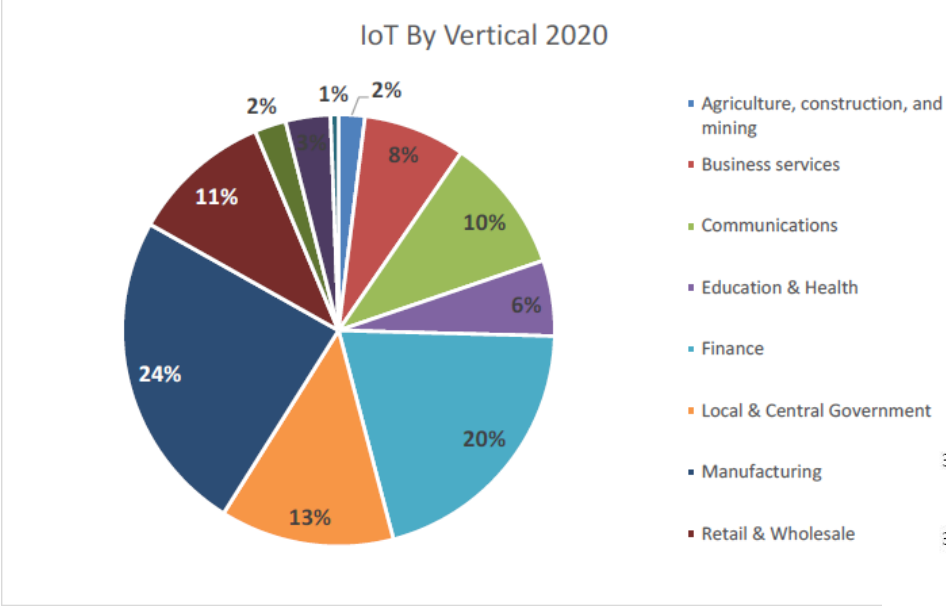
Research Coordinator at Politecnico di Milano, in the domain «ICT for Industry»

- Member of the IERC cluster (coordinating two FP7 projects OSMOSE and FITMAN)
- Major contributor to the ClusterBook 2015 & 2016 chapter about IoT in Manufacturing
- Organiser of special sessions at EU IOT WEEK (Lisbon Belgrade) about IOT / CPS
- Contributor to AIOTI WG11 chaired by EFFRA
- Coordinator of two Factories of the Future H2020 actions: PSYMBIOSYS / BEinCPPS



http://www.internet-of-things-research.eu/

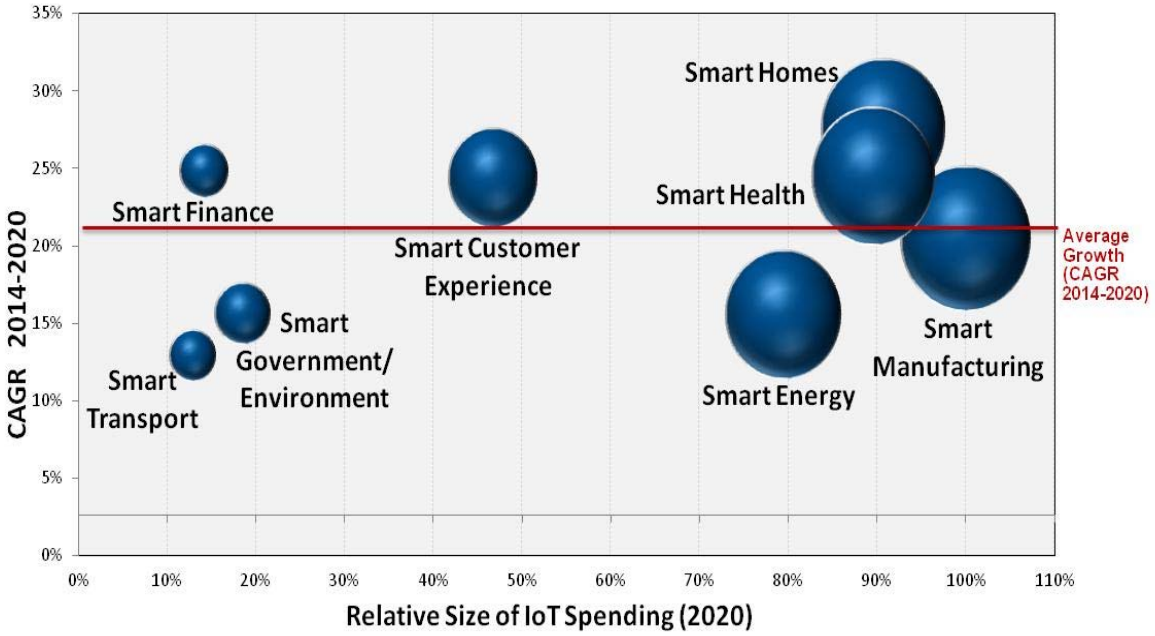
IOT-driven Innovation in Manufacturing



Source: IDC 2014

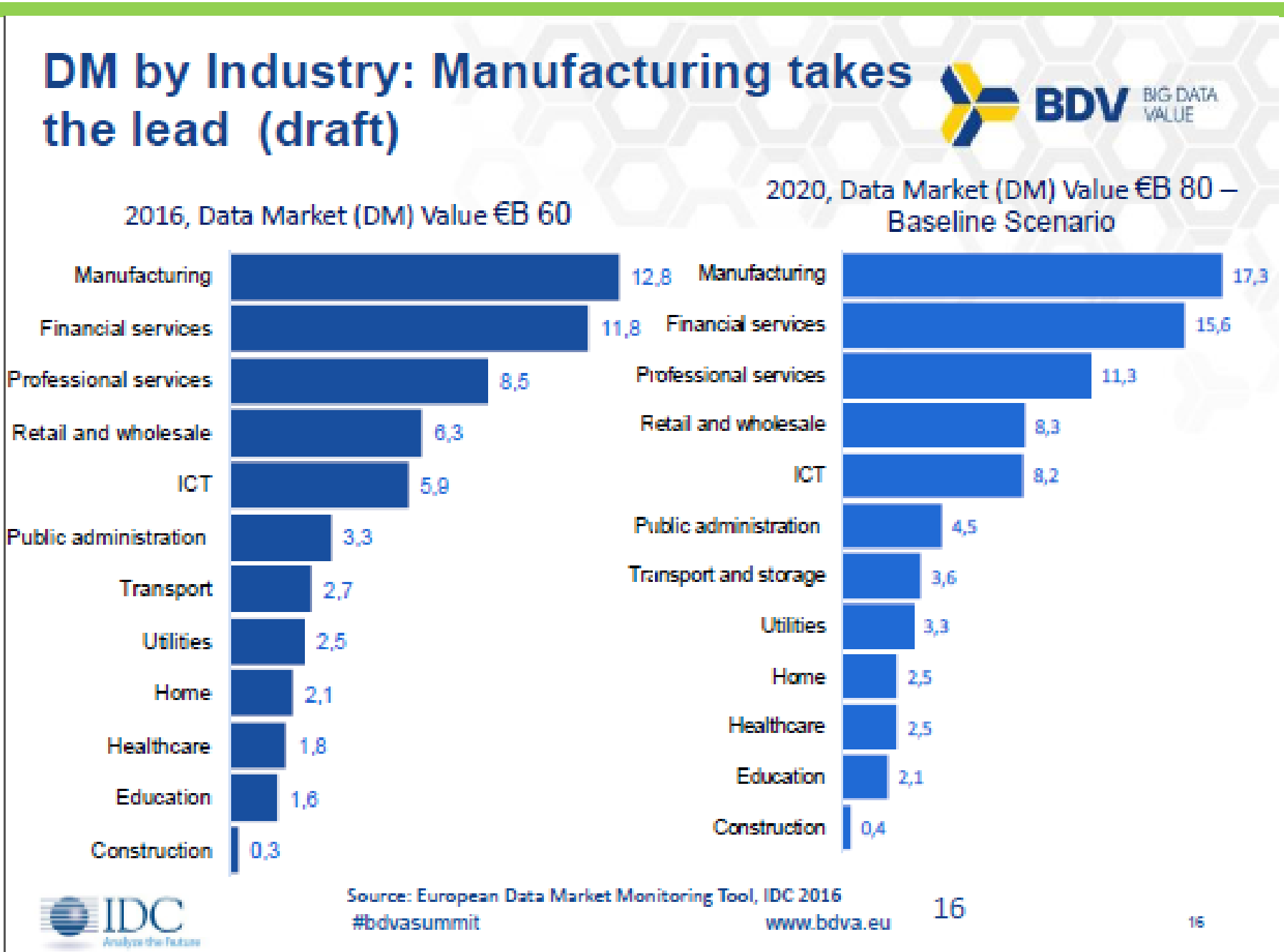
Smart Manufacturing excels not just in the potential size of the market, but is also well positioned regarding the estimated growth of such a market

Smart Manufacturing is one of the most promising domains for IOT-driven innovation (24% of the estimated IOT EU market size)



http://ec.europa.eu/digital-agenda/en/news/definition-research-and-innovation-policy-leveraging-cloud-computing-and-iot-combination

Data-driven Innovation in Manufacturing



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MILANO 1863

Milano, 21 settembre 2016

Piano nazionale Industria 4.0

Investimenti, produttività e innovazione

Milano, 21 Settembre 2016

Piano Nazionale Industria 4.0: obiettivi

Piano nazionale Industria 4.0 2017-2020

Obiettivi

Direttrici chiave

Investimenti innovativi

+10 €Mld
incremento investimenti privati da 80 a 90 €Mld nel 2017

+11,3 €Mld
di spesa privata in R&S&I con maggiore focus su tecnologie I4.0 nel periodo 2017-2020

+2,6 €Mld
volume investimenti privati early stage mobilitati nel periodo 2017 – 2020

Competenze

200.000
studenti universitari e **3.000** manager specializzati su temi I4.0

+100%
studenti iscritti ad Istituti Tecnici Superiori su temi I4.0

~1.400
dottorati di ricerca con focus su I4.0 (vs. ~5.000 previsti nel PNR)

Competence Center nazionali

Direttrici di accompagnamento

Infrastrutture abilitanti

100%
delle aziende italiane coperte a 30Mbps entro il 2020

50%
delle aziende italiane coperte a 100Mbps entro il 2020

6 consorzi
in ambito standard IoT presidiati in aggiunta ai tavoli istituzionali a partire dal 2017

Strumenti pubblici di supporto

+0,9 €Mld
Riforma e rifinanziamento per il 2017 del Fondo Centrale di Garanzia

+1 €Mld
Contratti di sviluppo focalizzati su investimenti I4.0

+0,1 €Mld
Forte investimento su catene digitali di vendita (Piano Made in Italy)

Scambio salario – produttività tramite incremento RAL e limite massimo agevolabile

Fonte: Cabina di Regia Industria 4.0

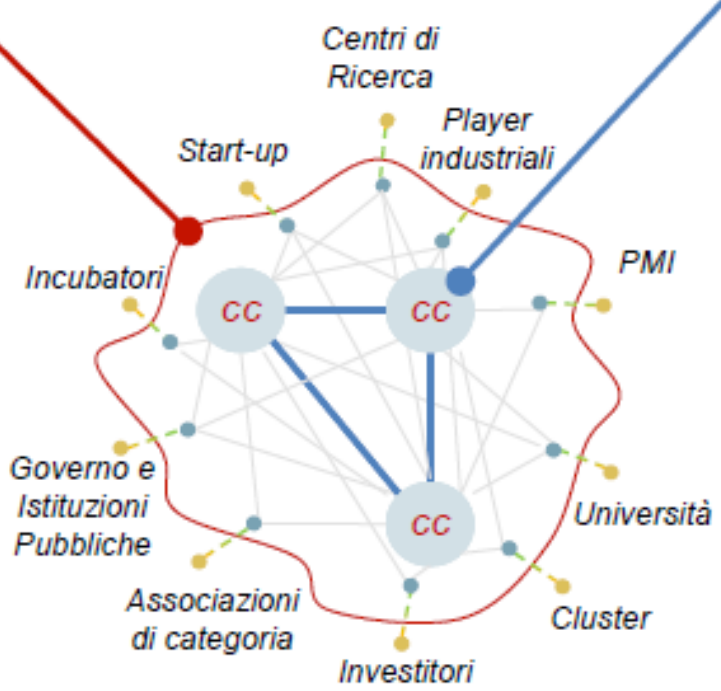
Piano Nazionale Industria 4.0: CC e DIH

Competenze:
Digital Innovation Hub e Competence Center I4.0

Digital Innovation Hub

Caratteristiche:
- Selezionati DIH pivotando su sedi Confindustria e R.E TE. Imprese Italia sul territorio
- Ponte tra imprese, ricerca e finanza

Mission:
- Sensibilizzazione delle imprese su opportunità esistenti in ambito I4.0
- Supporto nelle attività di pianificazione di investimenti innovativi
- Indirizzamento verso Competence Center I4.0
- Supporto per l'accesso a strumenti di finanziamento pubblico e privato
- Servizio di mentoring alle imprese
- Interazione con DIH europei



Competence Center I4.0

Caratteristiche:
- Pochi e selezionati Competence Center nazionali
- Forte coinvolgimento di poli universitari di eccellenza e grandi player privati
- Contribuzione di stakeholder chiave (e.g. centri di ricerca, start-up,..)
- Polarizzazione dei centri su ambiti tecnologici specifici e complementari
- Modello giuridico e competenze manageriali adeguate

Mission:
- Formazione e awareness su I4.0
- Live demo su nuove tecnologie e accesso a best practice in ambito I4.0
- Advisory tecnologica per PMI su I4.0
- Lancio ed accelerazione di progetti innovativi e di sviluppo tecnologico
- Supporto alla sperimentazione e produzione "in vivo" di nuove tecnologie I4.0
- Coordinamento con centri di competenza europei

Fonte: MIUR

The German approach: Industrie 4.0 (2011)

Figure 1:
The four stages of
the Industrial Revolution

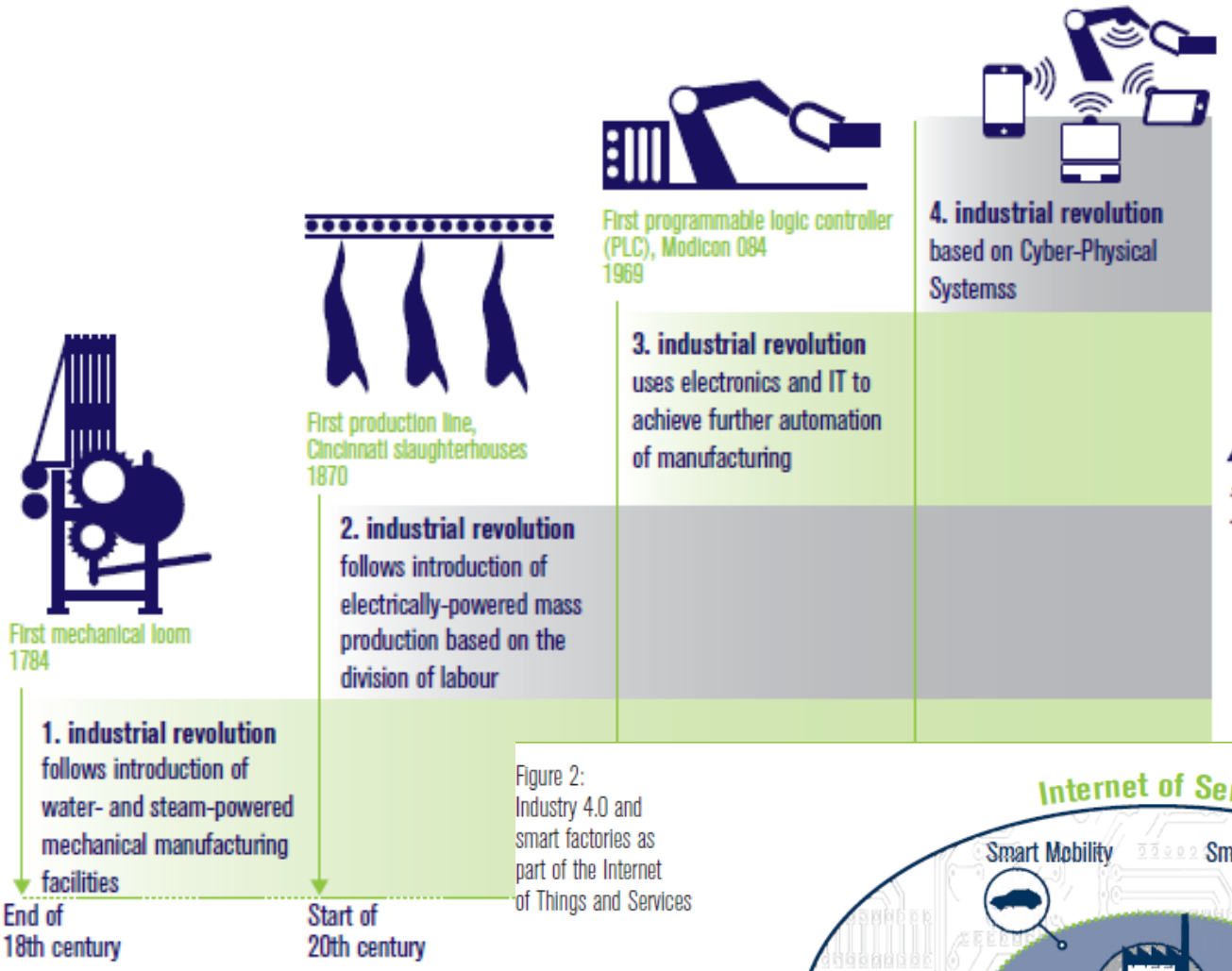
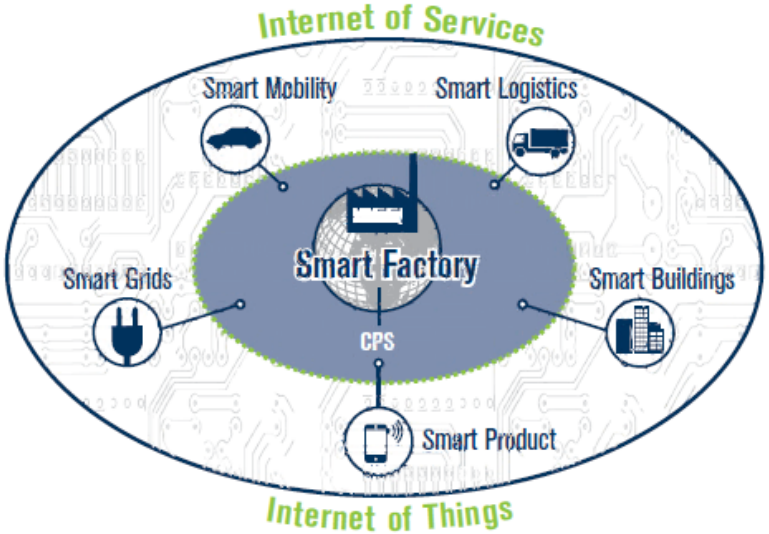


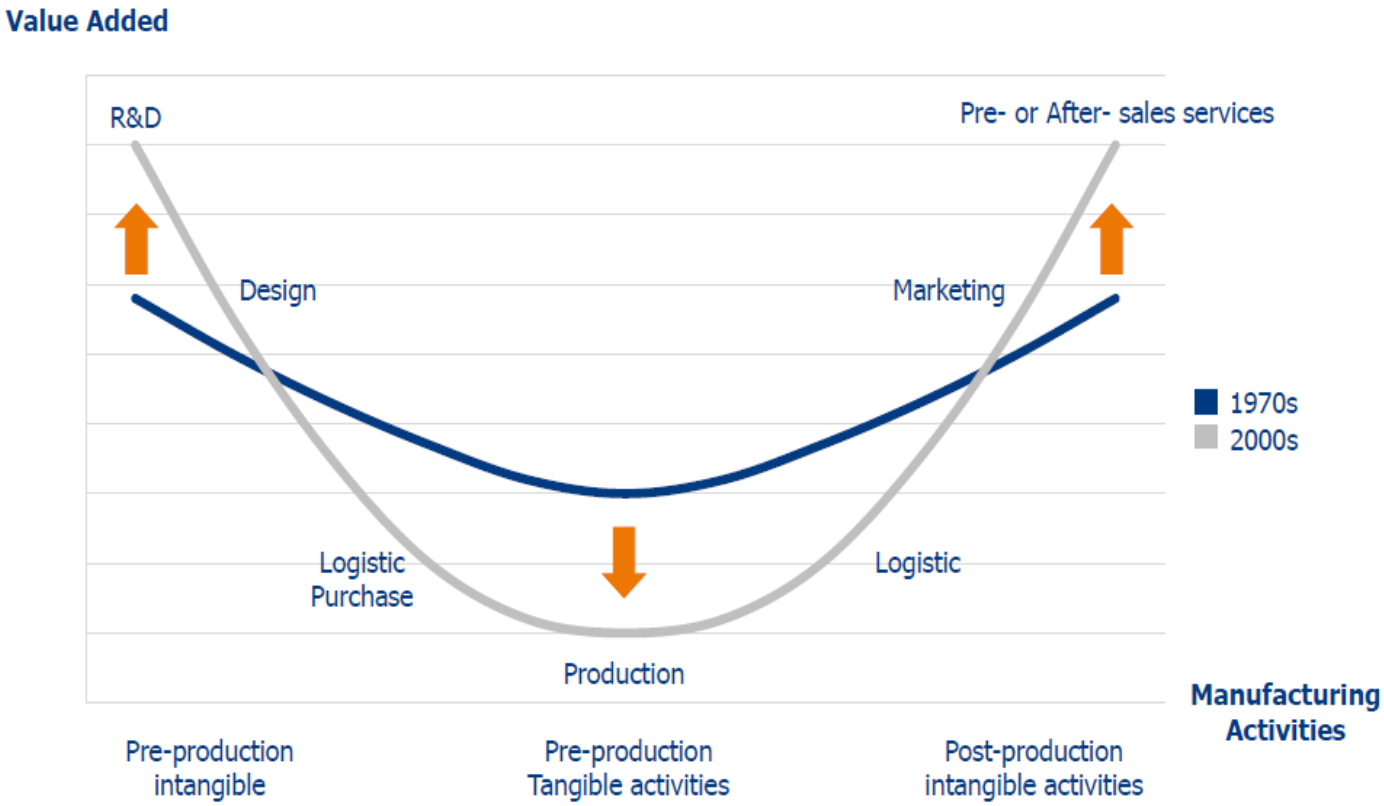
Figure 2:
Industry 4.0 and
smart factories as
part of the Internet
of Things and Services



World Manufacturing Forum WMF 2014

Manufacturing Evolution: SMILE

The "SMILE" challenge: European businesses must focus on high value added activities



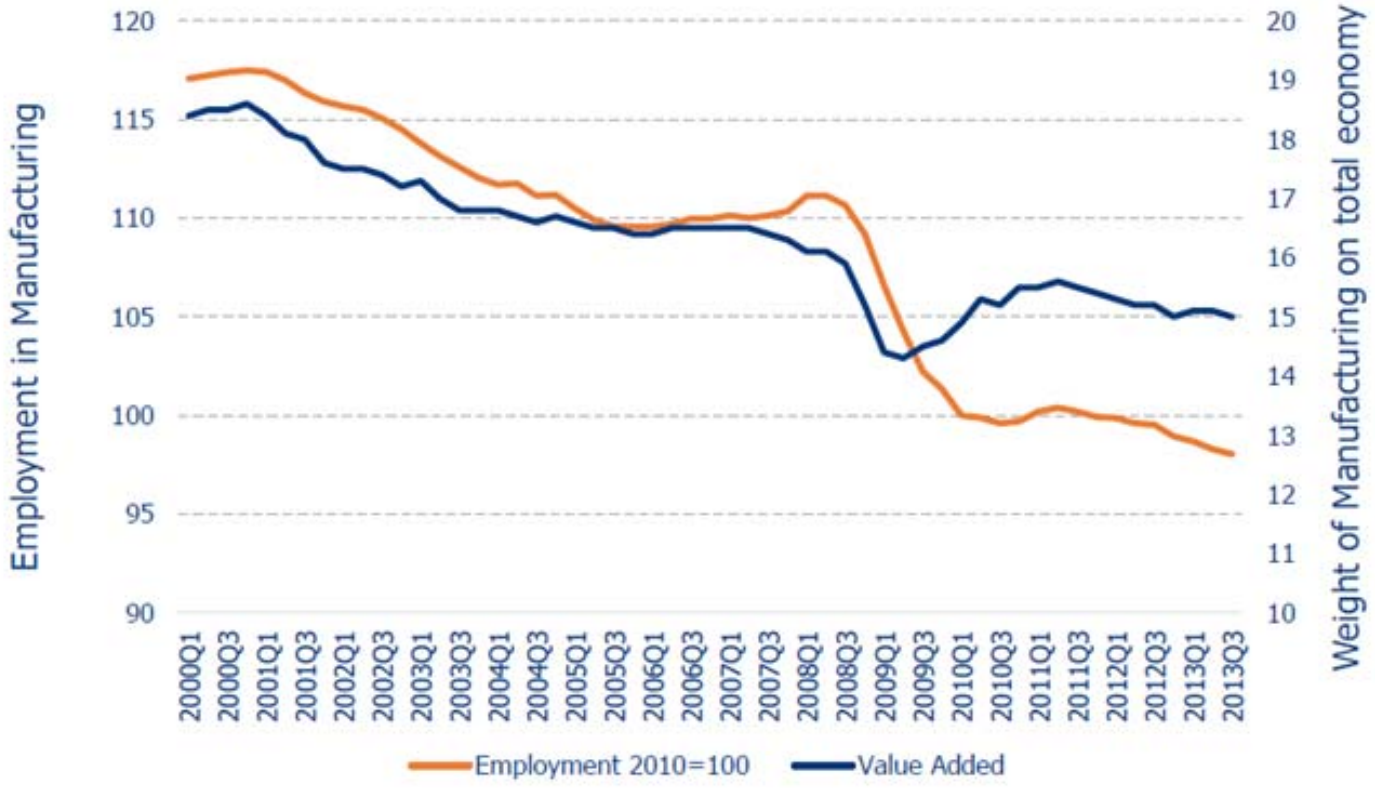
- Value creation in Manufacturing is progressively shifting **towards pre-production** (R&D and Design) and **post production** (marketing and Pre-or-After sales service) activities

Source: The European House - Ambrosetti re-elaboration on Bruegel data, 2014

Manufacturing growth vs. jobs: FORK

But European Manufacturing is also affected by a long-term structural decline ...

Value Added (% of total) **and employment** (2010=100) **of Manufacturing in the EU-28**, 2000Q1-2013Q3

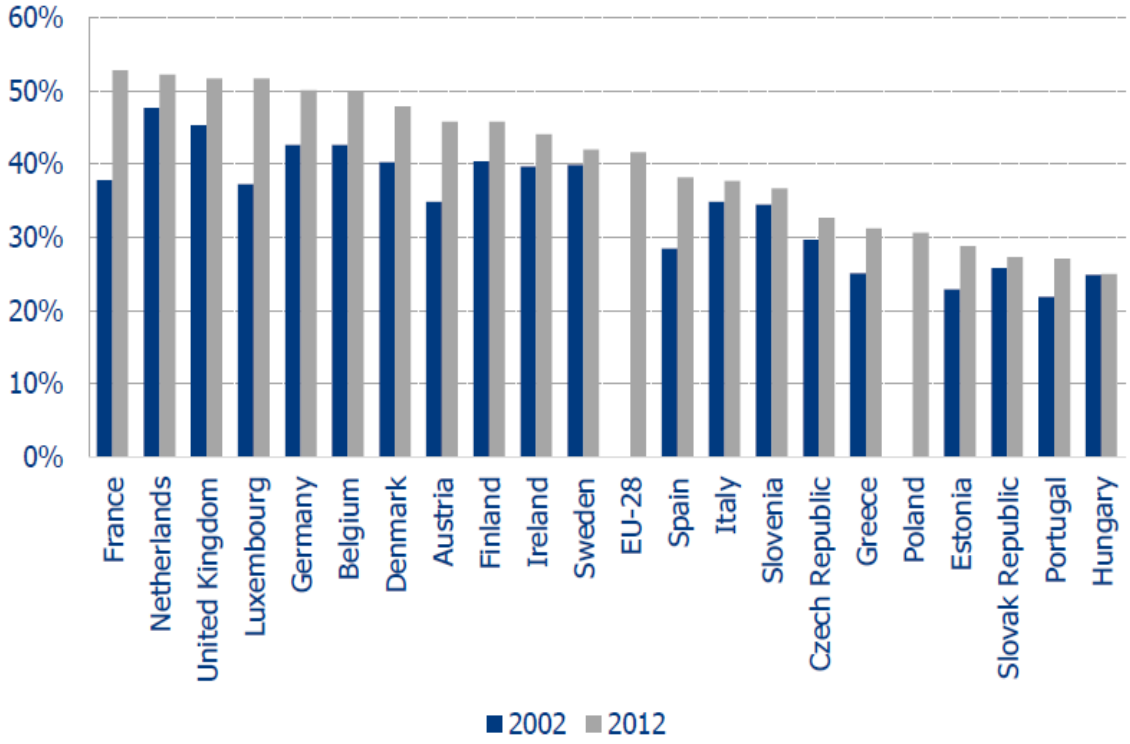


Source: The European House - Ambrosetti re-elaboration on Eurostat and AMECO data, 2014

Manufacturing Servitisation: BOOST

… as the boundaries between Manufacturing and Services are blurring

Share of service-related jobs in the manufacturing sector, 2002-2012



- Producing goods is becoming **a smaller part of manufacturing firms'** activities
- Manufacturing now provides a **wide spectrum of services**: from pre- and after- sales services, to design, R&D and marketing services
- Ultimately, the boundaries between Manufacturing and Services are **blurring**

Source: The European House - Ambrosetti re-elaboration on OECD data, 2013

World Manufacturing Forum WMF 2016

WMF
2016
World Manufacturing Forum

The Industrie 4.0 transition (revolution)

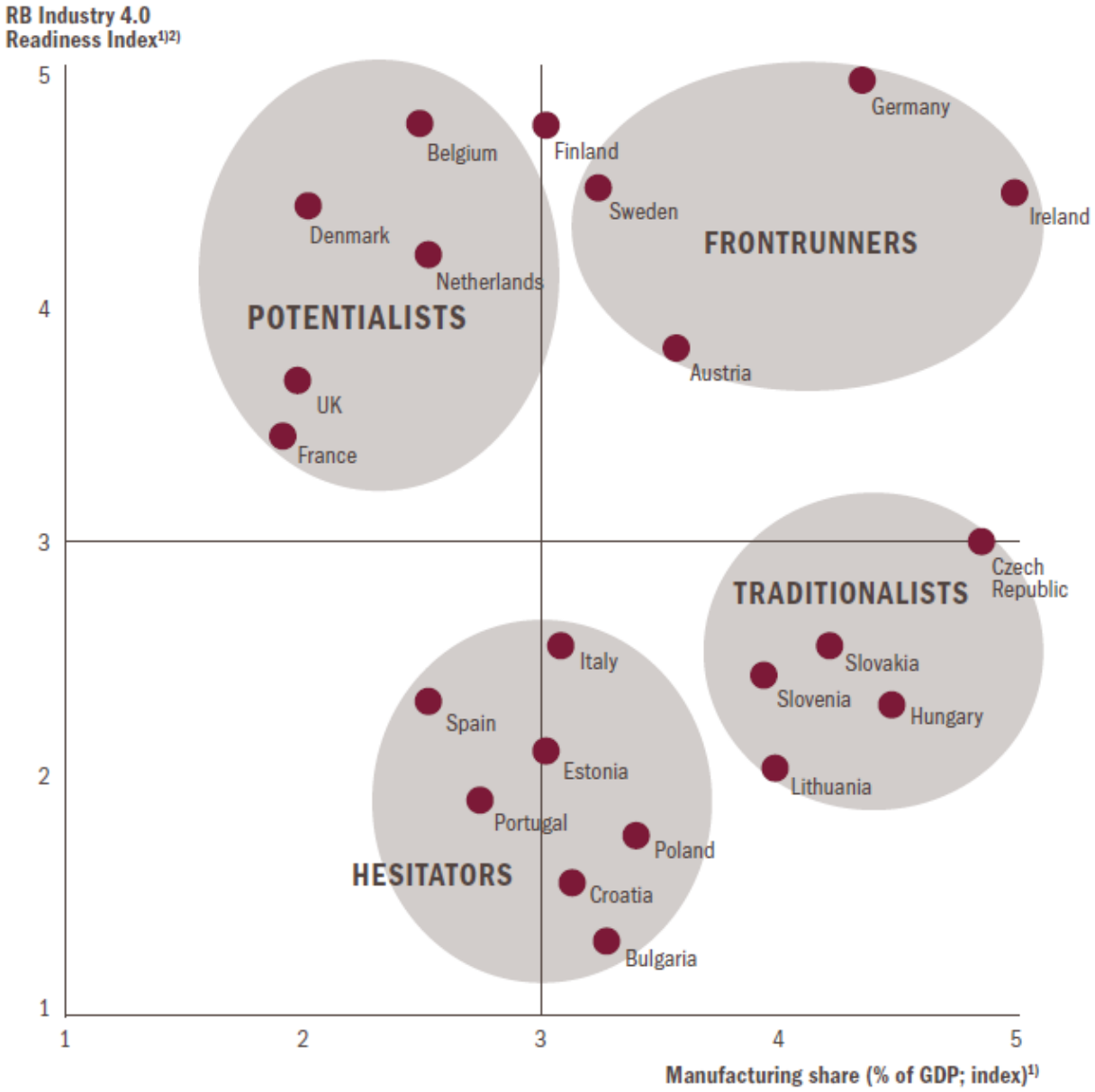
Industrie 4.0 is changing the paradigm of manufacturing strategy

Roland Berger

Characteristics of new Industrie 4.0

1 FROM MASS PRODUCTION TO **MASS CUSTOMIZATION**	Flexible production, short production lead time enabling new business models emergence and affordable customization
2 FROM VOLUME SCALE EFFECT TO **LOCALIZED & FLEXIBLE UNITS**	From large factories specialized per product in LCC to smart factories with high technological equipment enabling to produce at competitive cost everywhere
3 FROM PLANNED MAKE TO STOCK TO **DYNAMIC MAKE TO ORDER**	From an organized production, based on planning and forecast and supported by stocks, to dynamic production and yield management, on demand
4 FROM PRODUCT TO **USAGE**	Integrated conception, services being a key element of the business model/ decision factor
5 FROM COST DRIVEN **TO ROCE DRIVEN**	Higher ROCE for lower Capital employed as complexity is transferred on numeric
6 FROM TAYLORISM **TO FLEXIBLE WORK ORGANIZATION**	Remote work (augmented reality, permanent connectivity), Tasks parallelism, flexible organization and management
7 FROM HARD WORKING CONDITIONS **TO ATTRACTIVE WORK SPACE**	Development of complex artisanal production, with clean/ highly connected work space, white collars intensive

The Industrie 4.0 readiness index



1) 1 – low, 5 – high 2) Adjusted for outliers Cyprus, Latvia, Luxemburg, Romania, Greece

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National & Regional Initiatives

CATAPULT High Value Manufacturing

MADE Manufacturing Academy of Denmark

smart industry DUTCH INDUSTRY FIT FOR THE FUTURE

PRODUKTION2030

fabbrica intelligente

FLANDERS MAKE

fimecc Finnish Metals and Engineering Competence Cluster

Plattform INDUSTRIE 4.0

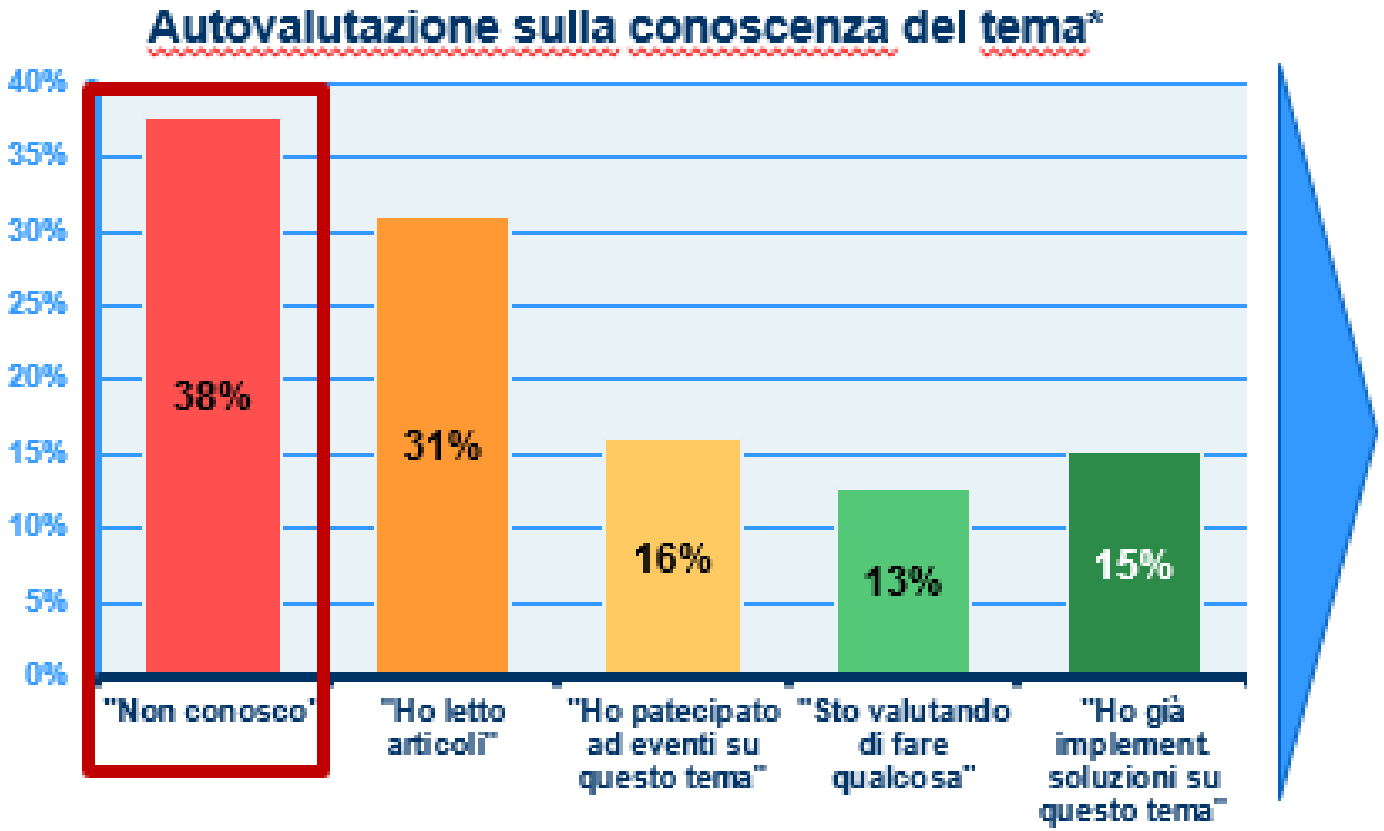
MADE DIFFERENT FACTORIES OF THE FUTURE

PRODUTECH

Anella Industrial.cat

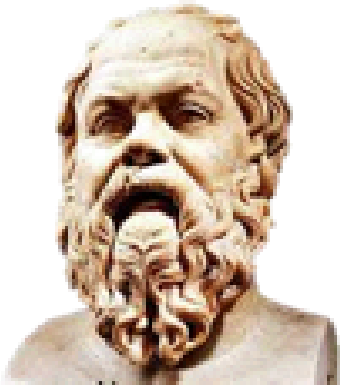
Smart Manufacturing Observatory

Awareness of Industrie 4.0 In Italy



Oltre un terzo dei rispondenti dichiara di non sapere di cosa stiamo parlando oggi!

"So di non sapere..."



*Campione: 305 aziende, domanda a risposta multipla

fabbrica intelligente

Information & Operations Technologies

SMART MANUFACTURING TECHNOLOGIES

- **Industrial Internet of Things**
- **Advanced Human-Machine Interface**
- **Industrial Analytics**
- **Advanced Automation**
- **Cloud Manufacturing**
- **Additive Manufacturing**

TRADITIONAL SOLUTIONS

PRODUCT DEVELOPMENT & ENGINEERING

- CAD/CAM
- Computer Aided Engineering (CFD, FEM)
- Product Data Management
- Product Lifecycle Management

PRODUCTION, PLANNING & GOVERNANCE

- Warehouse Management System
- Manufacturing Execution System
- Advanced Planning Systems
- Computerized Maintenance Management Systems
- Governance Risk and Compliance

Survey on Smart Manufacturing: Maturity Model

SMART TECHNOLOGIES	PROCESSES: Smart Lifecycle	Smart Supply Chain	Smart Factory
Cloud Manufacturing	8%	11%	20%
Industrial Analytics	11%	15%	20%
Industrial IoT	9%	9%	16%
Advanced HMI	8%	4%	16%
Advanced Automation	3%	3%	13%
Additive Manufacturing	20%	1%	8%

EU Open Platforms for Digital Industry: FoF PPP

EC Research / Innovation Initiatives in ICT for Manufacturing

A provocative statement (I)

Factories of the Future
Conference 2016
Materialising Factories 4.0

VOLVO

The future of advanced manufacturing – A Volvo Group perspective

Urban Wass
Senior Vice President, Research & Innovation Policy

Summary

- No manufacturing without competitive products and services – Parallel development
- The advanced manufacturing industry drives digitization
- PPPs and other parts of the European ecosystem will continue to be extremely important

A provocative statement (II)

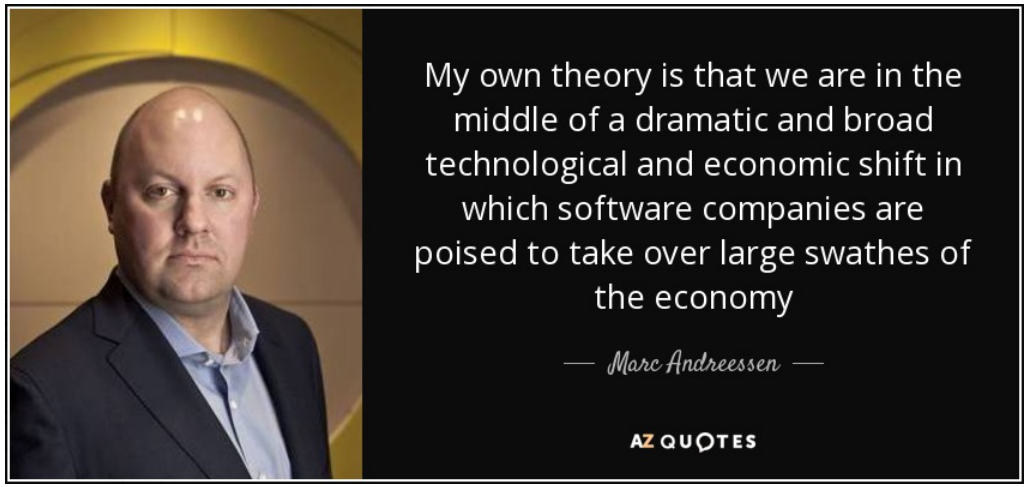
Rosa García
Presidenta de Siemens en España

"Software, itself, does nothing, it does not build anything, it does not save lives. The objective should be to **adapt it to industrial technologies**. Unify the software with the tools already available".

The fundamental challenge is to start a business process digitalisation in sectors so far not digitised, which opens a world of opportunities for enterprises".

July 2014

A provocative statement (III)



Apple In Talks To Buy McLaren: Report

Michael Ballaban
16 minutes ago · Filed to: MCLAREN

6.3K 71 1

Apple has been secretly working on electric and autonomous vehicles for some time. McLaren could help make those plans a reality by adding know-how about actually building cars to Apple's technology chops. And the company would lend Apple some high-end branding: In addition to making luxury cars, McLaren is also known for its Formula 1 team.

The acquisition would also be comparably cheap, at least for the automotive space: McLaren is valued between £ 1 billion and £1.5 billion ($1.3 billion to $1.95 billion), according to the Financial Times. Still, the paper is reporting that a deal is not certain.

Symbiotic Ecosystems: Uber and Daimler

Uber Has Apparently Ordered $10 Billion Worth of Mercedes S-Class Sedans

That's a lot of expensive luxury cars for an app dedicated to undercutting local taxi prices.

Reuters reports that Uber has placed a long-term order with Daimler to the tune of "at least 100,000" S-Class sedans. That, fair reader, is a car that costs something like $100,000 each, making this potentially a $10 billion deal. (Mar 18, 2016)

DIGITISING EUROPEAN INDUSTRY
European Commission proposal

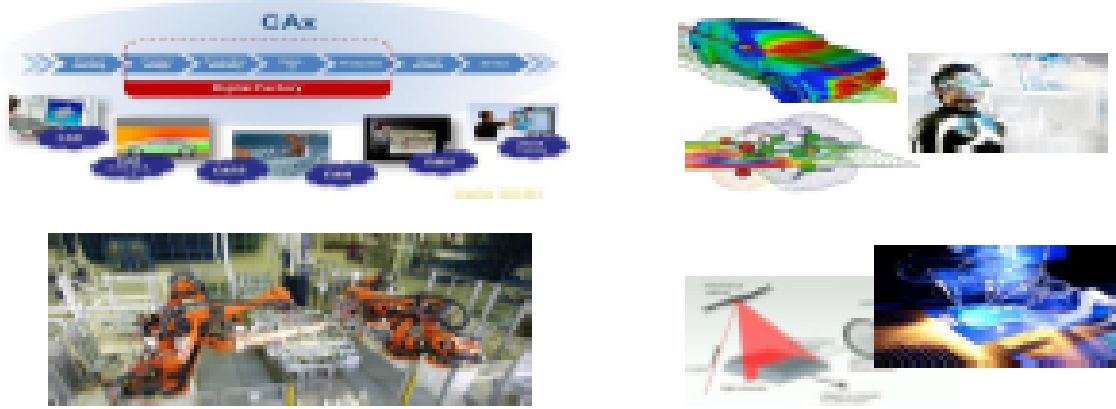
What is this about?

- Measures that enable all sectors to benefit from digital innovation
  - For higher value products with "digital inside"
  - Increased efficiency of processes
  - Adapted and reshaped business models including relevant services
- A set of coherent measures
  - EU cloud initiative, Standardisation strategy, Forthcoming free flow of data, skills and jobs, European Fund for Strategic Investment (EFSI), Regional policies (ESIF), eGov action plan, Telecom review, Innovrefit.
- Coordination of various initiatives from Member States, regions, EU
  - Pool resources, avoid fragmentation and support DSM (Digital Single Market)

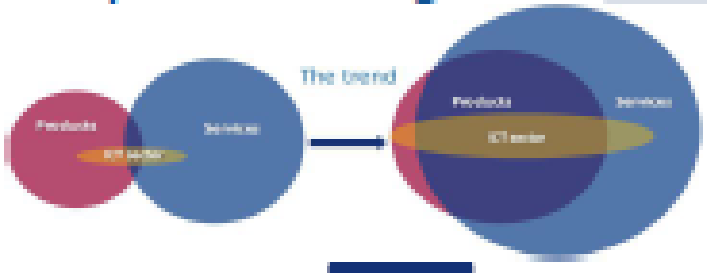
Three dimensions of Value Creation from Digitisation

"Digital inside": Innovations in products (all types)

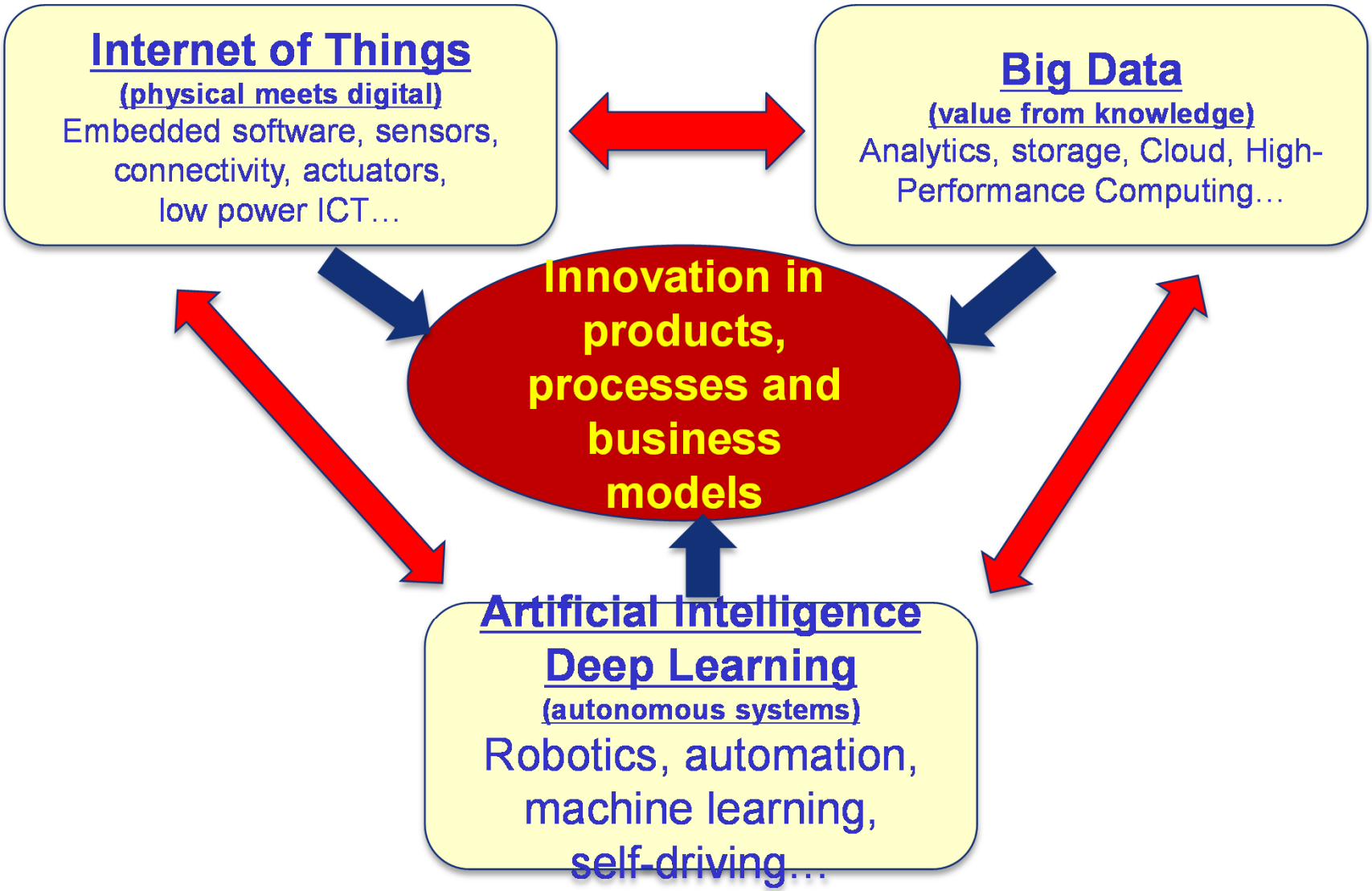
Digital transformations of processes



Radical/disruptive changes in business models



DIGITISING EUROPEAN INDUSTRY
Technologies driving the change



Starting Point (1): Industry–driven platforms

European Commission

Community-led sector-specific (vertical)

RAMI

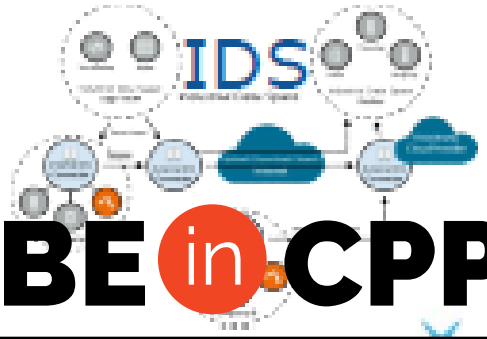
FITMAN

FI-WARE
FITMAN

Community-led cross-sector (horizontal)

S3P
SMART, SAFE & SECURE PLATFORM

IDS



BE in CPPS

AIOTI

CRYSTAL

Industrial Internet CONSORTIUM

ARROWHEAD

FAR edge

Proprietary with open interfaces

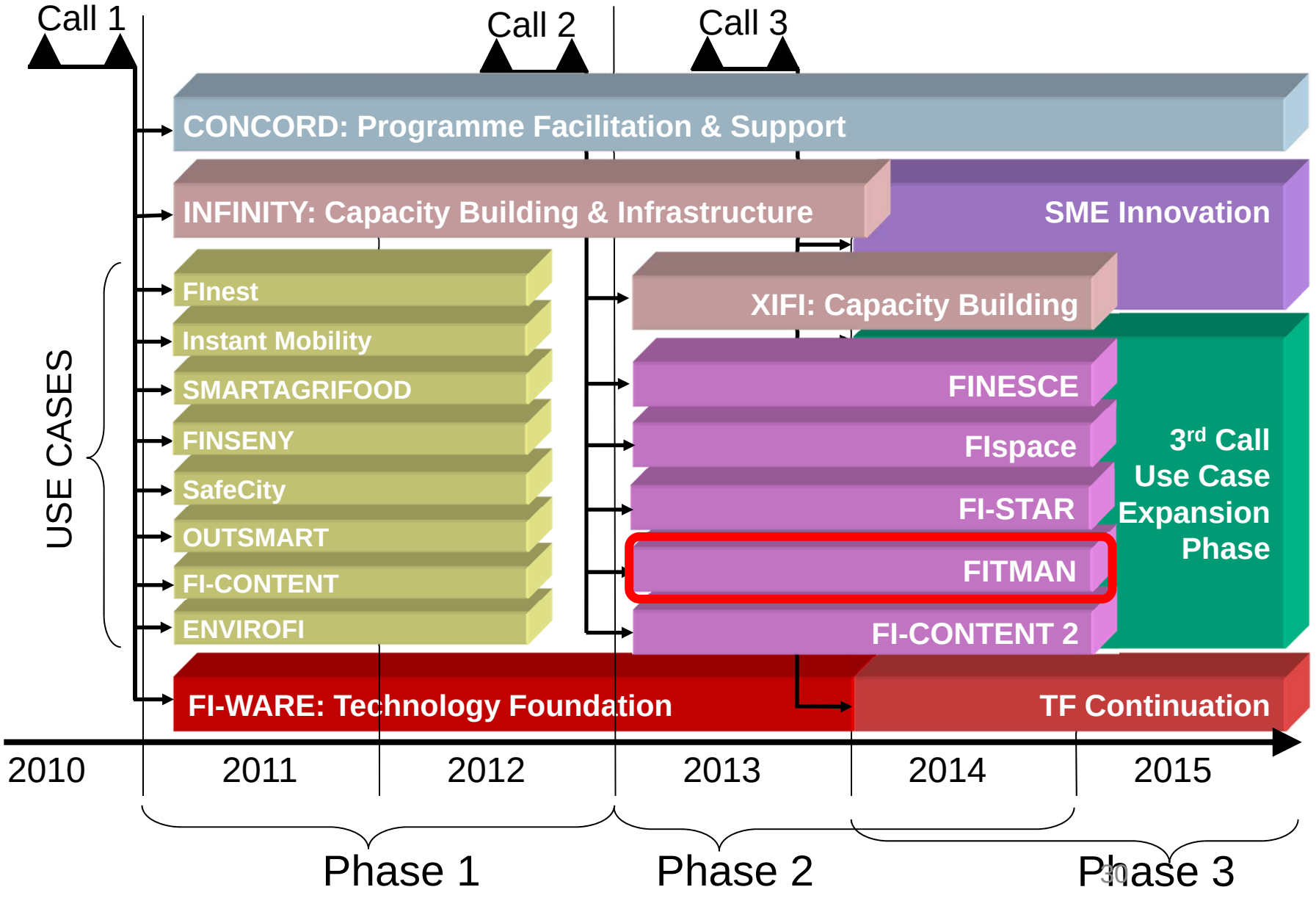
SIEMENS

DASSAULT SYSTEMES

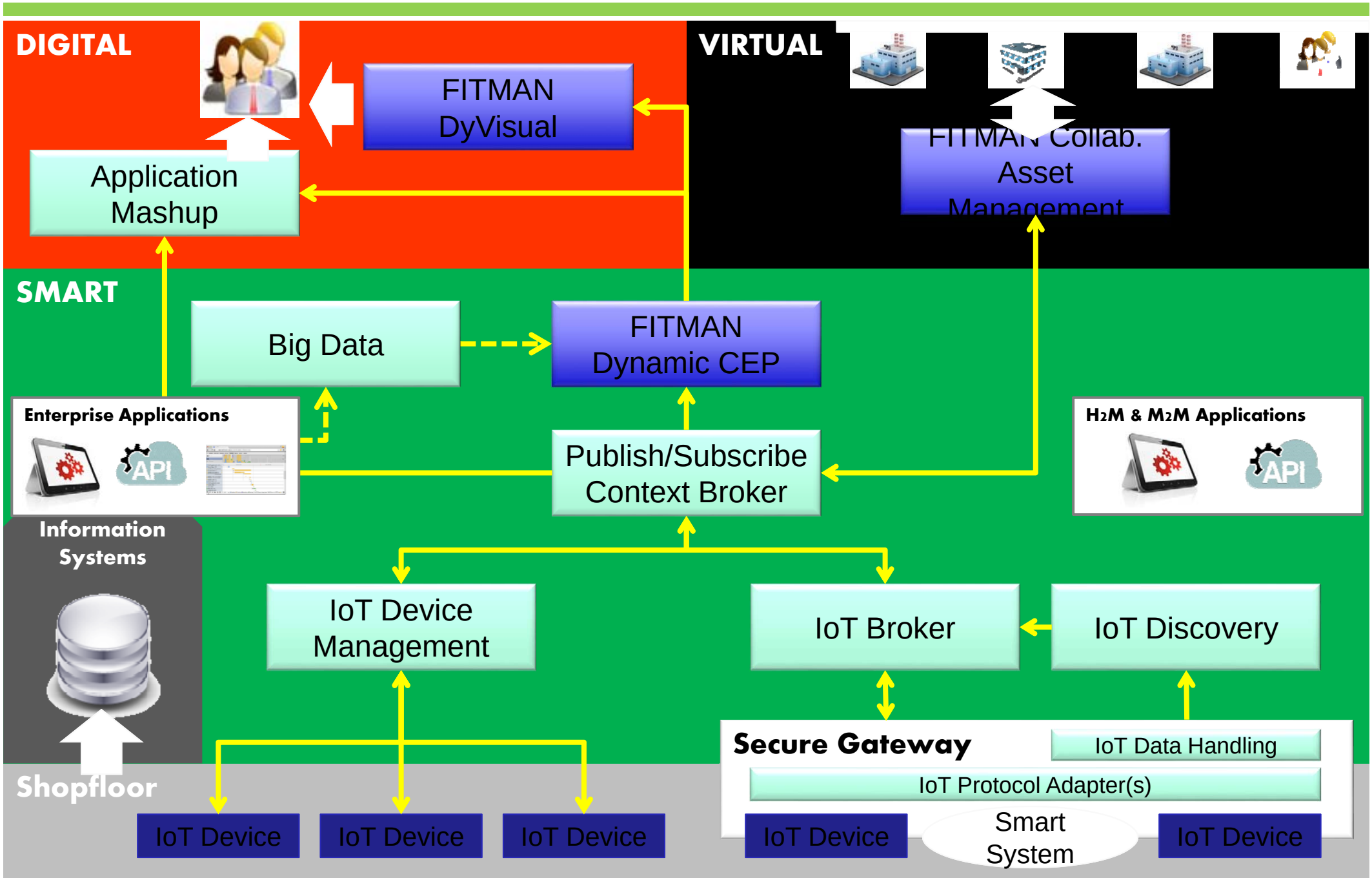
SAP HANA
for Supply Chain and Manufacturing

GE Predix

The EU FI PPP (FIWARE) and FITMAN



FITMAN Industrial IOT Platform



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Take Away Messages

1. **Manufacturing Industry** needs to evolve towards service-oriented products, processes and business models (sharing)
2. **Industrie 4.0** is a leading edge movement in all Countries: German interpretation is production- automation-centric
3. **Digitising Industry** EC communication leverages on new ICT to Industrial Modernisation and Transformation (DIH Migration)
4. **Leadership in Digital Platforms** for Industry is one of the priorities for EC-funded R&I programs. Data-driven platforms have been developed in different domains
5. **FIWARE for Industry** is one of these platforms and is already adopted by several H2020 projects, especially in the Factories of the Future PPP (BEinCPPS open calls, FoF11)

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www.fiwareforindustry.eu for Open Source components

www.beincpps.eu for Open Calls for Experiments