

IoT in Manufacturing Initiatives in America and EU

Bilbao, June 7th 2018



BDV BIG DATA
VALUE

Sergio Gusmeroli

Engineering Ingegneria Informatica S.p.A





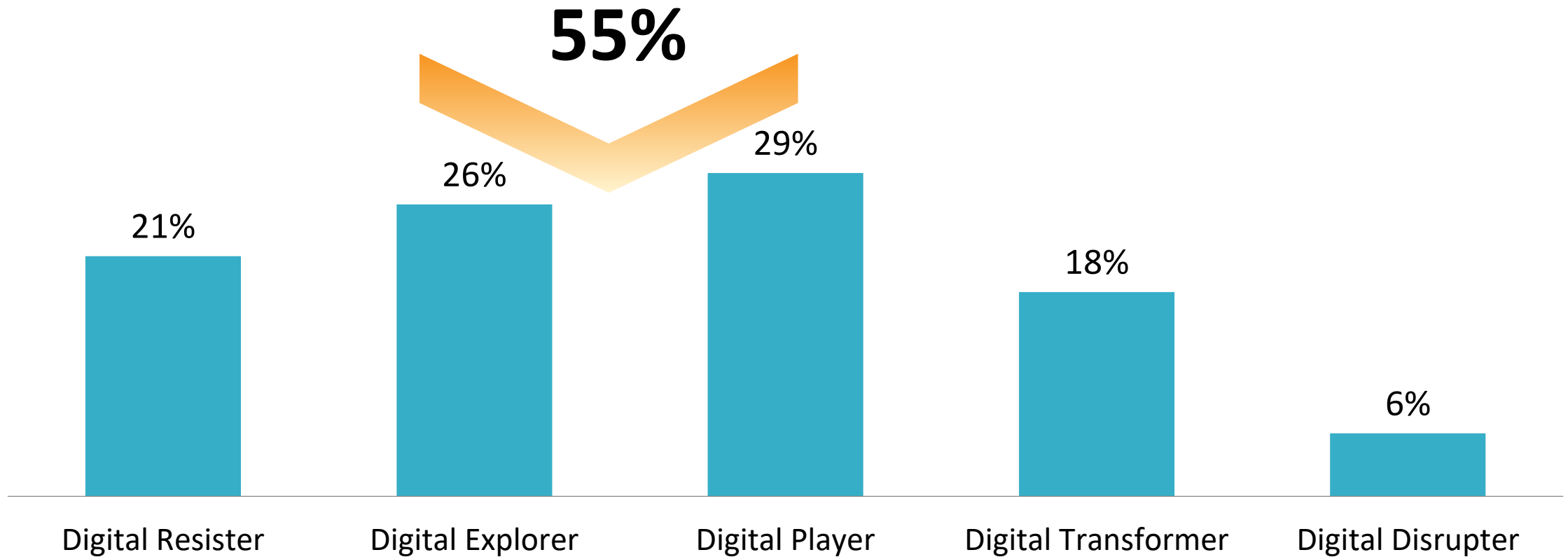
\$1.7 T

By the end of 2019,
Digital Transformation
(DX) spending is
expected to reach \$1.7
trillion worldwide, a 42%
increase from 2017.



European Organizations slowly moving to Digital Transformation

Digital Transformation is the approach by which enterprises drive changes in their business models and ecosystems by leveraging digital competencies.












Source: IDC, European Digital Transformation Maturity Model Benchmark, 2017; n=403, May 2017

Italian Survey on Smart Manufacturing 2017

Lo scenario applicativo - Survey Italia 2017

Le applicazioni

OSSERVATORI.NET
digital innovation

		PROCESSI		
		 Smart Lifecycle	 Smart Supply Chain	 Smart Factory
SMART TECHNOLOGIES	 Cloud Manufacturing	16%	13%	24%
	 Industrial Analytics	18%	32%	33%
	 Industrial IoT	18%	15%	38%
	 Advanced HMI	14%	5-10%	27%
	 Advanced Automation	0-5%	5-10%	26%
	 Additive Manufacturing	27%	0-5%	10%

Più di 800 applicazioni dichiarate, una media di 3,4 per azienda rispondente: Factory al centro della trasformazione, I-IoT e Analytics ne sono il motore abilitante

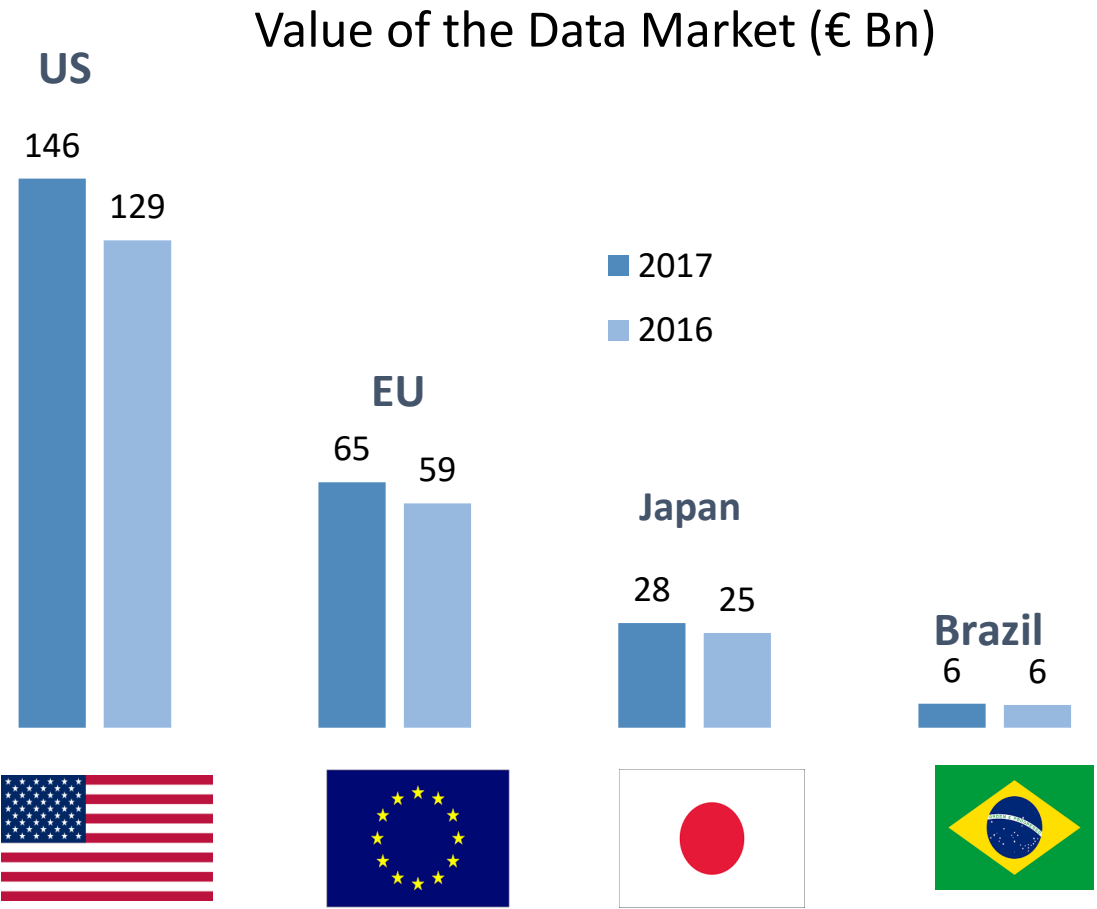
Base rispondenti: 241 aziende, domanda a risposta multipla



POLITECNICO
MILANO 1863

Manufacturing Group
SCHOOL OF MANAGEMENT

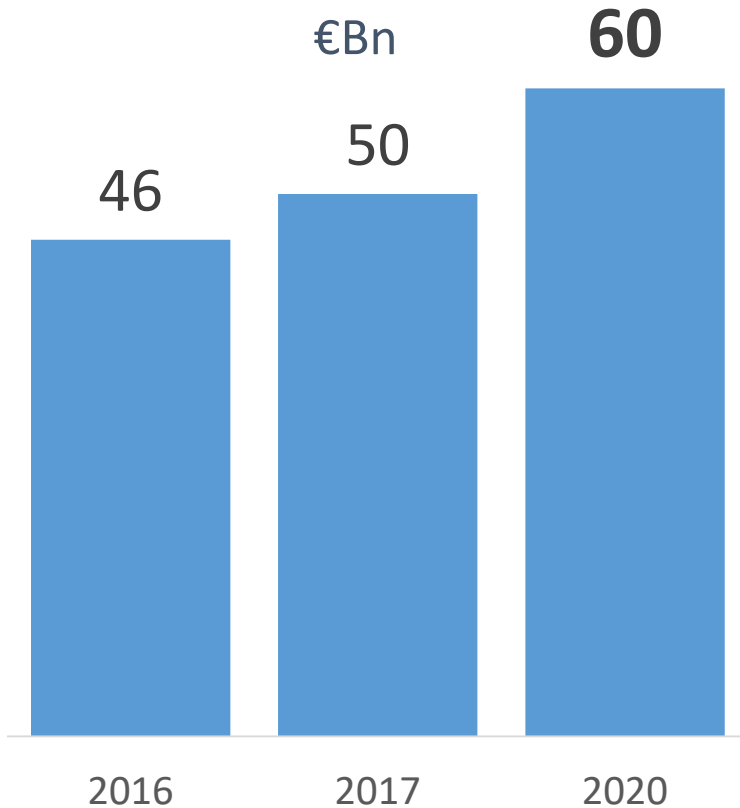
The EU is the second largest data market in the world



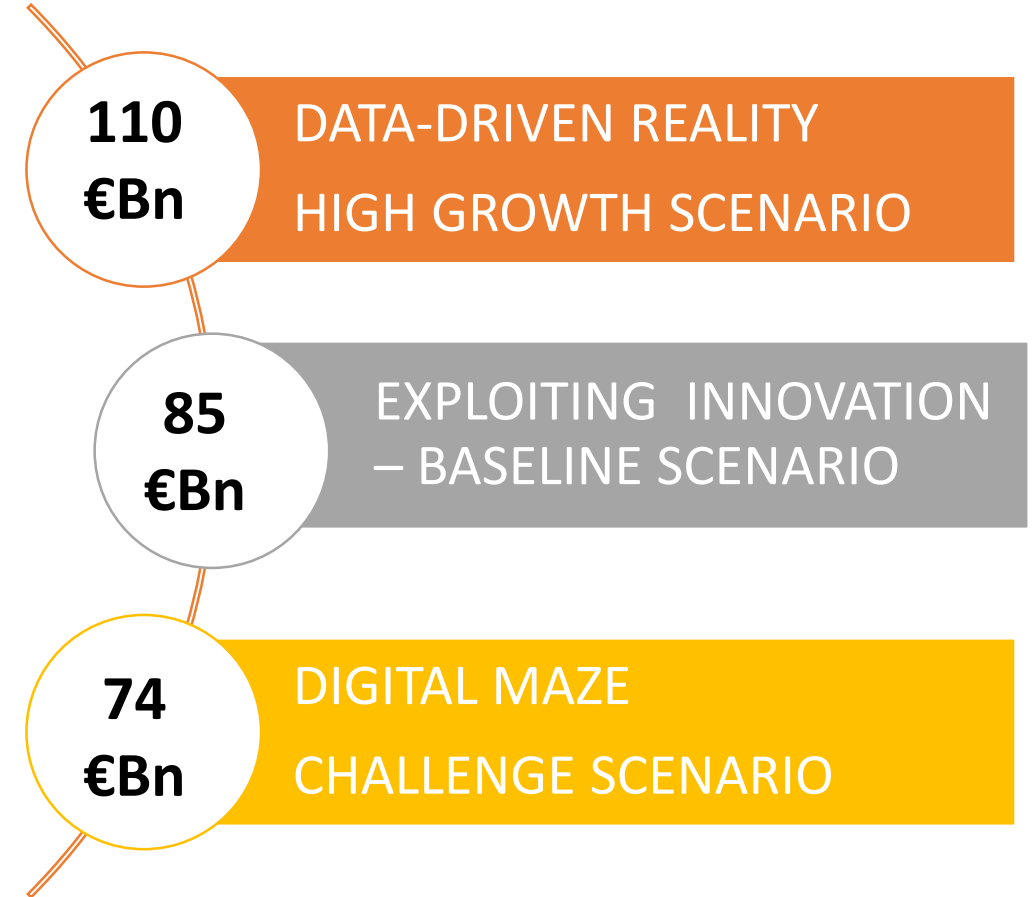
Incidence of the Data Economy on GDP			
Country	2016	2017	Growth rate 2017/ 2016
USA	0.78%	0.81%	4.2%
Brazil	0.16%	0.16%	0.4%
Japan	0.93%	0.95%	1.6%
EU28	0.42%	0.52%	24%

The Data Market value will double from 2017 to 2025

EU 27 Value 2017-2020



EU 27 Value
2025 Forecast Scenarios



Source: IDC, EDM Monitoring Tool, 2018



BIG DATA VALUE
PPP



BDV BIG DATA
VALUE

Accelerating data-driven innovation in Europe

Industry-driven and fully self-financed international non-for-profit organisation under Belgian law

194 Members

34 Large companies

58 SMEs

87 Research institutions

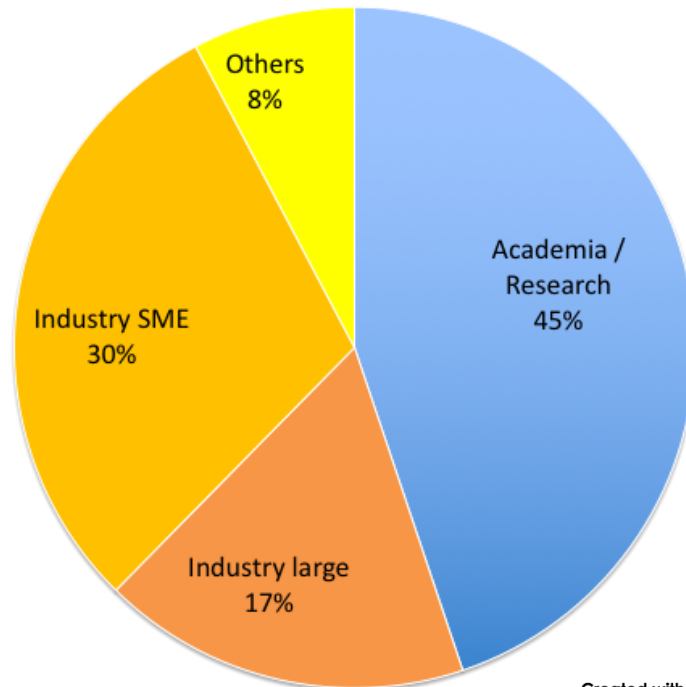
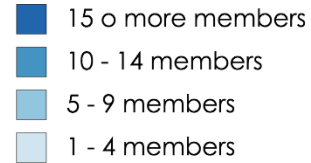
15 Others

90 FULL MEMBERS

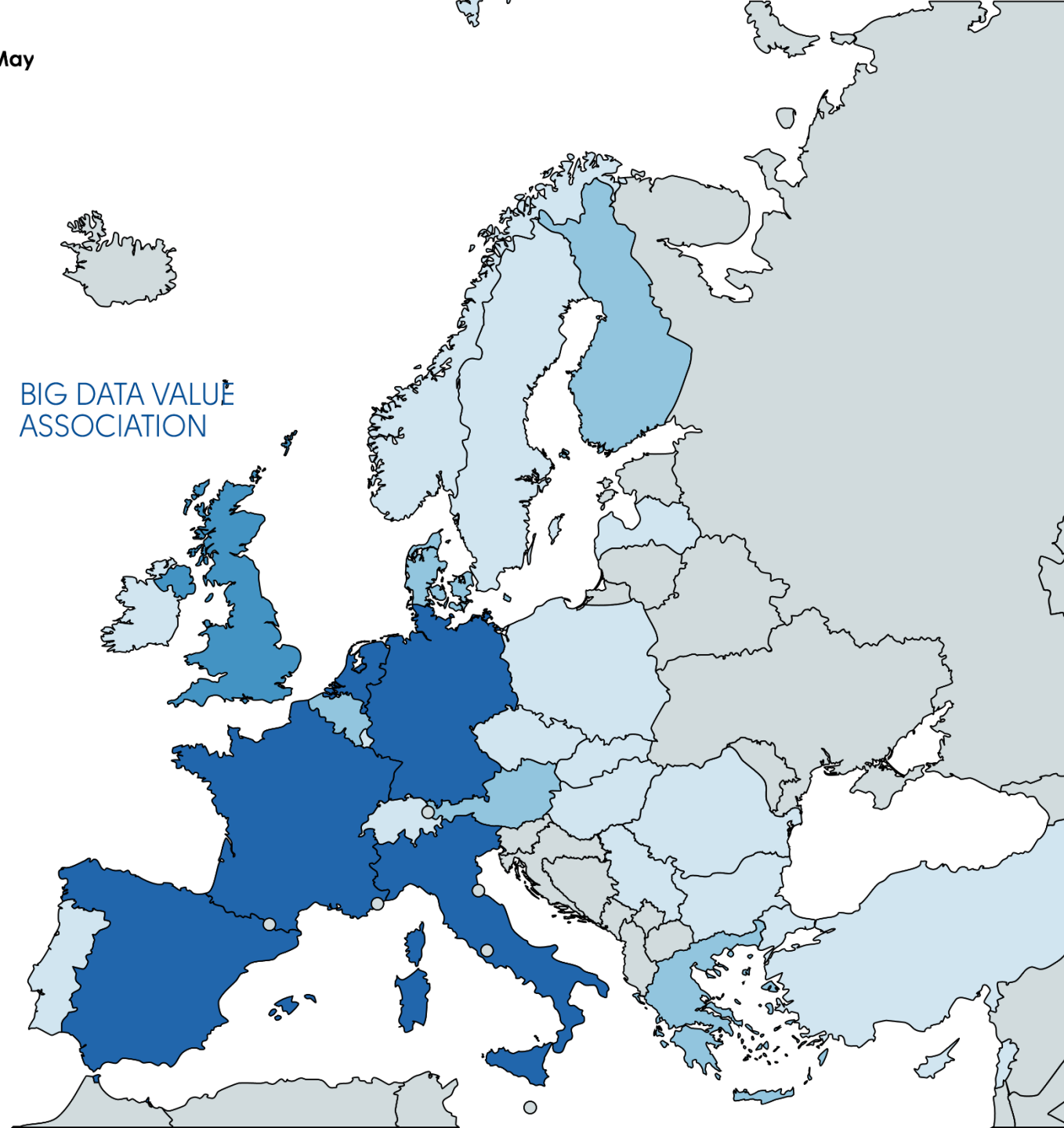
104 ASSOCIATE MEMBERS

Present in 28 countries

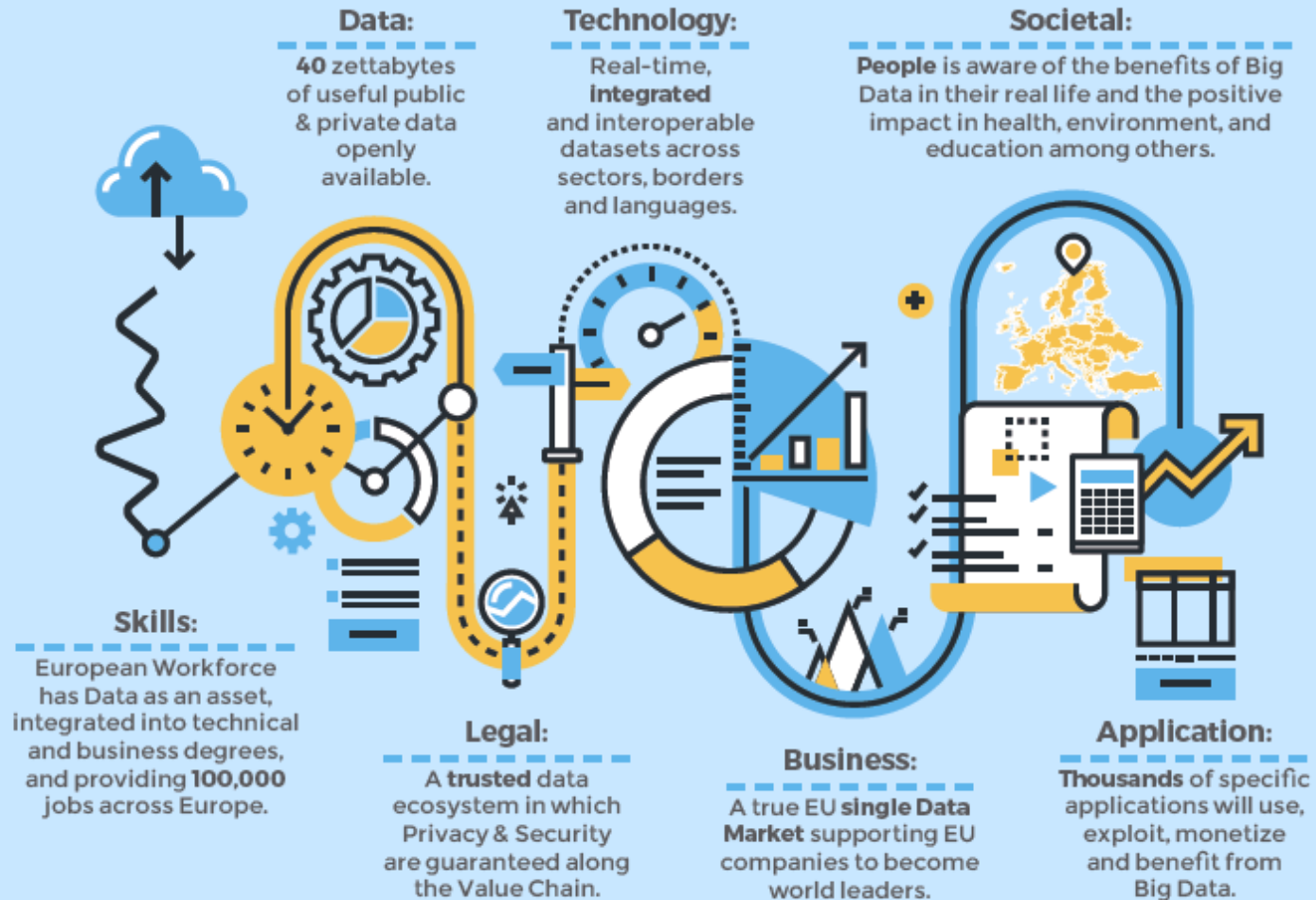
BDVA members per country (May 2017)



Created with mapchart.net ©



Big Data Value Vision for 2020



BDV SRIA

European Big Data Value Strategic Research and Innovation Agenda

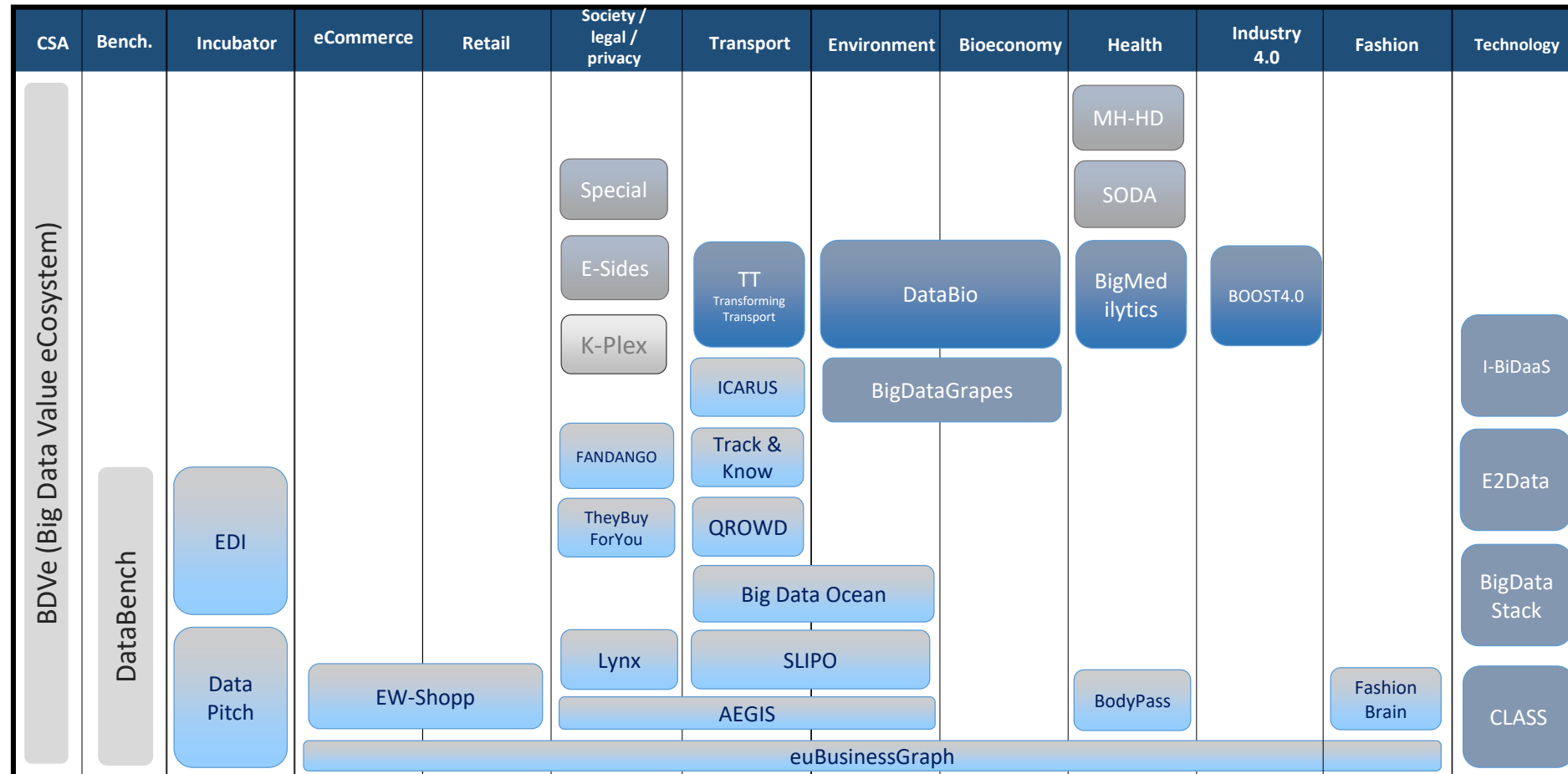
Version 4.0 October 2017

Accelerating Data-Driven Innovation in Europe

www.bdva.eu

SRIA v4.0 @www.bdva.eu

ICT14 ICT15 ICT16 ICT17 ICT18 ICT35



The SMI Discussion Paper 1.0

BDVA Smart Manufacturing Industry Discussion Paper¶

A Discussion Paper on Big Data challenges for BDVA and EFFRA Research & Innovation roadmaps alignment¶

The present discussion paper aims at identifying major research and innovation challenges for data-oriented Factories of the Future in 2025. It originates from a **cross-domain** collaboration between the Smart Manufacturing Industry subgroup of the BDVA cPPP (Big Data Value Association contractual Public Private Partnership <http://www.bdva.eu/>) and the Connected Factories cluster of the FOF cPPP (European Factories of the Future Research Association <http://www.effra.eu/>).

<http://www.bdva.eu/node/1002>

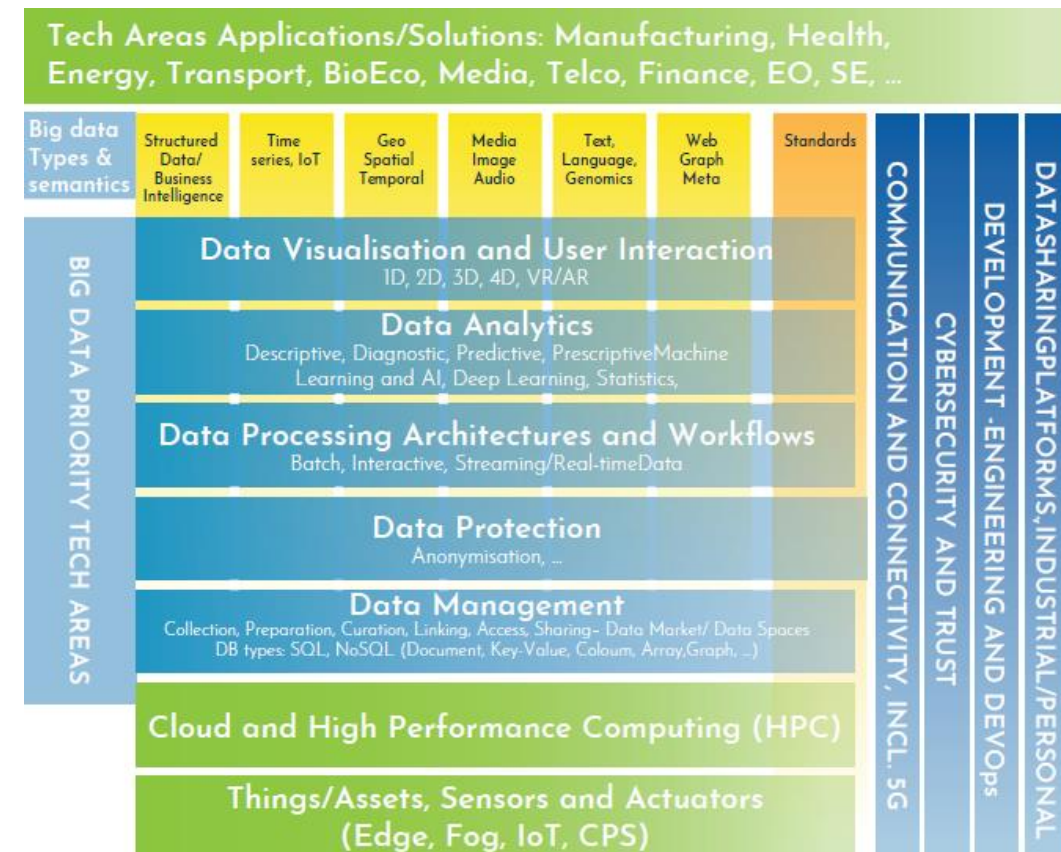


The SMI Discussion Paper 1.0: SRIA Background

BDVA·Smart·Manufacturing·Industry·Discussion·Paper¶

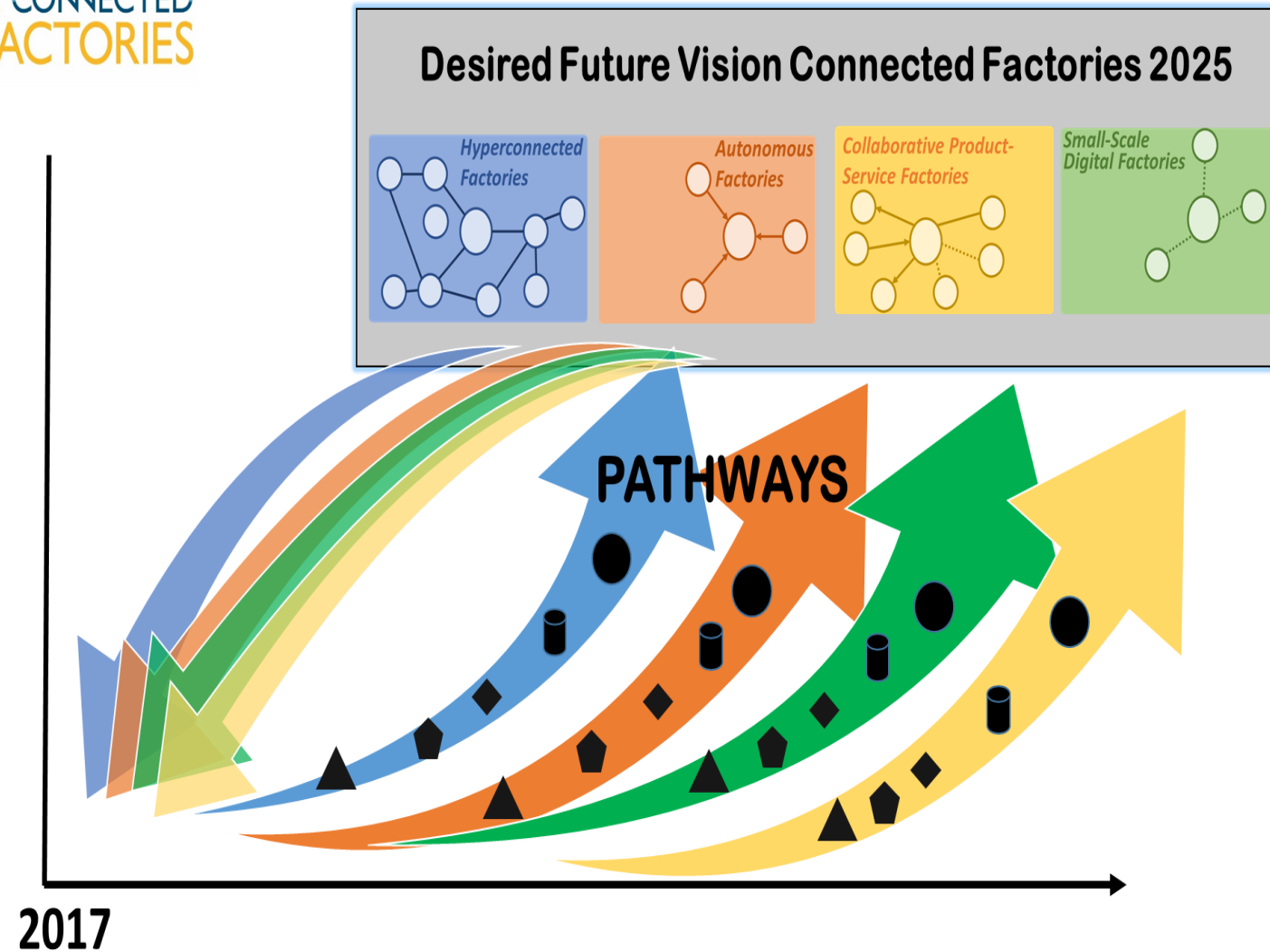
A·Discussion·Paper·on·Big·Data·challenges·for·BDVA·and·EFFRA·Research·&·Innovation·roadmaps·alignment¶

The **BDVA** background is materialised by its **SRIA** (Strategic Research and Innovation Agenda) five **Technical Challenges**, which address common requirements collected from several different application and industrial domains (e.g. manufacturing, energy, healthcare, transport, media, telco) when aiming to integrate different and diverse **data sources** (structured data, Time Series from the IoT, Geo-spatial data, multimedia and video data, textual and social networks data, artificial intelligence and semantic semi-structured data) for **value added** business and social applications, such as planning, optimisation, intelligence and decision support.

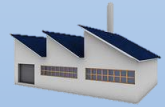


The SMI Discussion Paper 1.0: FoF background

The **FOF** background is materialised by its validation business scenarios of **Smart Factory, Smart Product and Smart Supply Chains** as projected to 2025 by the Connected Factories personas of Autonomous, Product-Service and Hyper-connected factories of the future. FOF is also providing its **reference architectures**, originated e.g. from **RAMI 4.0** Plattform Industrie 4.0 and the Industrial Internet Consortium, and data-driven implementation guidelines such as the **layered data-buses architecture** of **IIRA 1.8**.



The SMI Smart Manufacturing Scenarios



Smart Factory

Industry 4.0 Scenarios
Factory Automation
Machinery & Robots
Internal Logistics
Smart Workplaces
Cyber Physical Systems
Production Monitoring Ctrl
Predictive Maintenance
Zero Defect Manufacturing



Smart Product Lifecycle

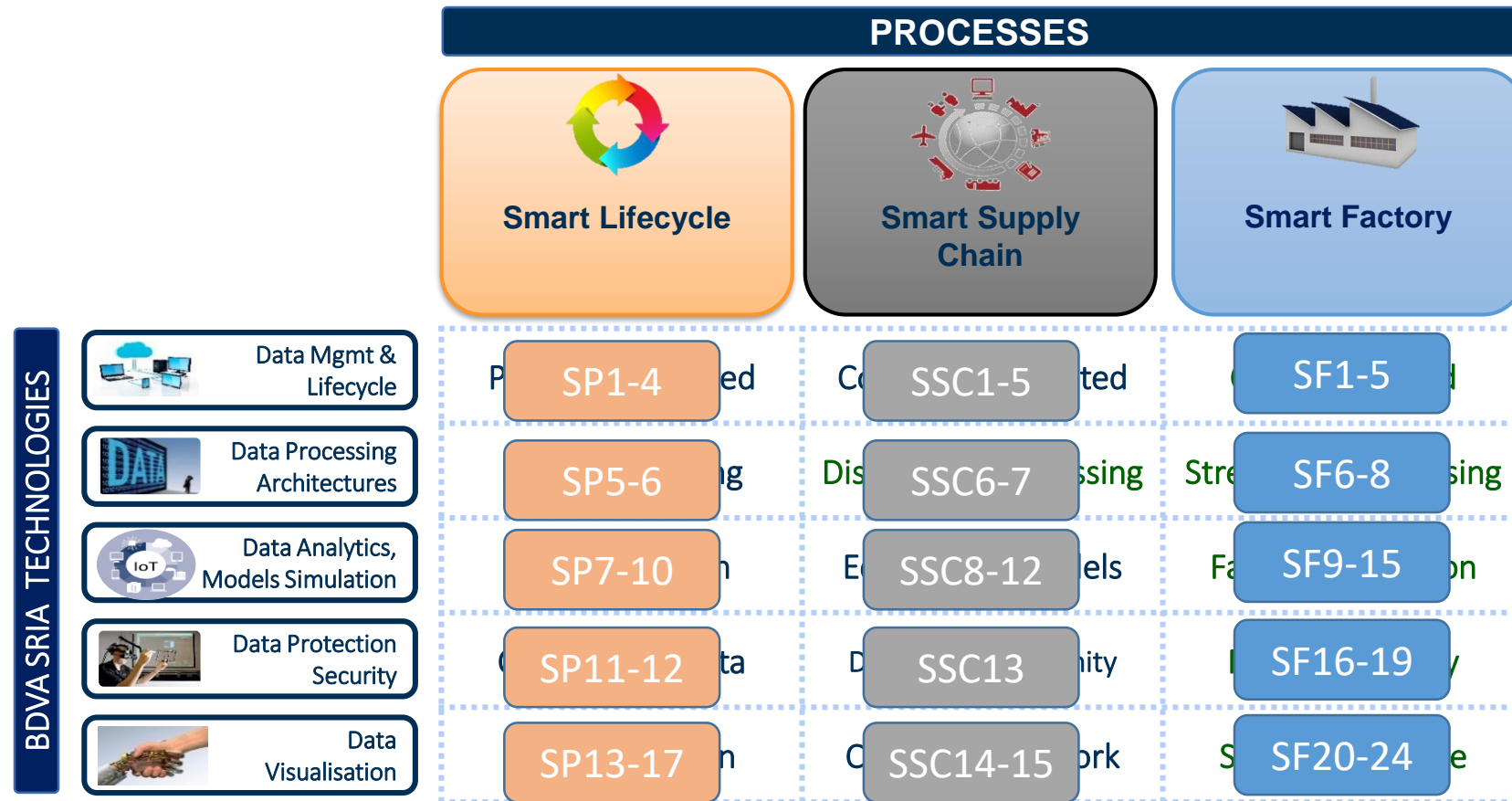
Product-Service Systems
Ideation LivingLabs
Product Design Engineering
Product Tracking & Tracing
As-design As-built As-Maint
End of Life Circular Economy
Post-sales Services
Sharing & Service Economy
Predictive Maintenance



Smart Supply Chain

Supply Chain Management
Value Networks
Business Ecosystems
Cross-sector Ecosystems
System Interoperability
Human Collaboration
Business Modelling
Innovation Ecosystems
Co-opetition Models

The reference framework & Technical Challenges



The SMI Discussion Paper 1.0

56 research and innovation challenges (inspired by the five BDVA research agenda topics of data management, processing, analytics, security and visualising) for the joint communities have been specified and classified in the three Grand Scenarios of **Smart Factory**, **Smart Product** and **Smart Supply Chain** scenarios.

- **Smart Factory scenarios**, new **highly distributed** data processing architectures, such as edge or fog computing ones, are envisaged to complement the current Real-Digital world dichotomy between embedded real-world systems and remote cloud-HPC systems.
- **Smart Product scenarios**, a data-driven approach based on advanced analytics and **artificial intelligence** allows the closed loop interaction among all the phases of the product lifecycle, supporting for instance product-service design and engineering (professional knowledge and wisdom of the crowd), product constant tracking and tracing (as-designed, as-built, as-maintained data) and environmental sustainability at the End of Life (de- re-manufacturing, circular economy).
- **Smart Supply Chain scenarios**, the most important challenge regards **data security and confidentiality** in hyper-connected global but agile value networks, where collaboration and partnership are mandatory, but needs to be ruled in legal, technological and business terms. The Data Sovereignty concept has recently emerged as a very promising principle, under which to build next generation industrial data platforms at European and trans-national level.

The BOOST 4.0 Smart Factory / Product Pilots

Big Data Factory 4.0 Transformation

Smart Digital Engineering



Smart Planning



Smart Operations & Digital Workplace



Smart Connected Production



Smart Maintenance & Service



Boost 4.0
BIG DATA FOR FACTORIES



The BOOST 4.0 Smart Factory / Product Pilots

Use Case: Zero defect manufacturing

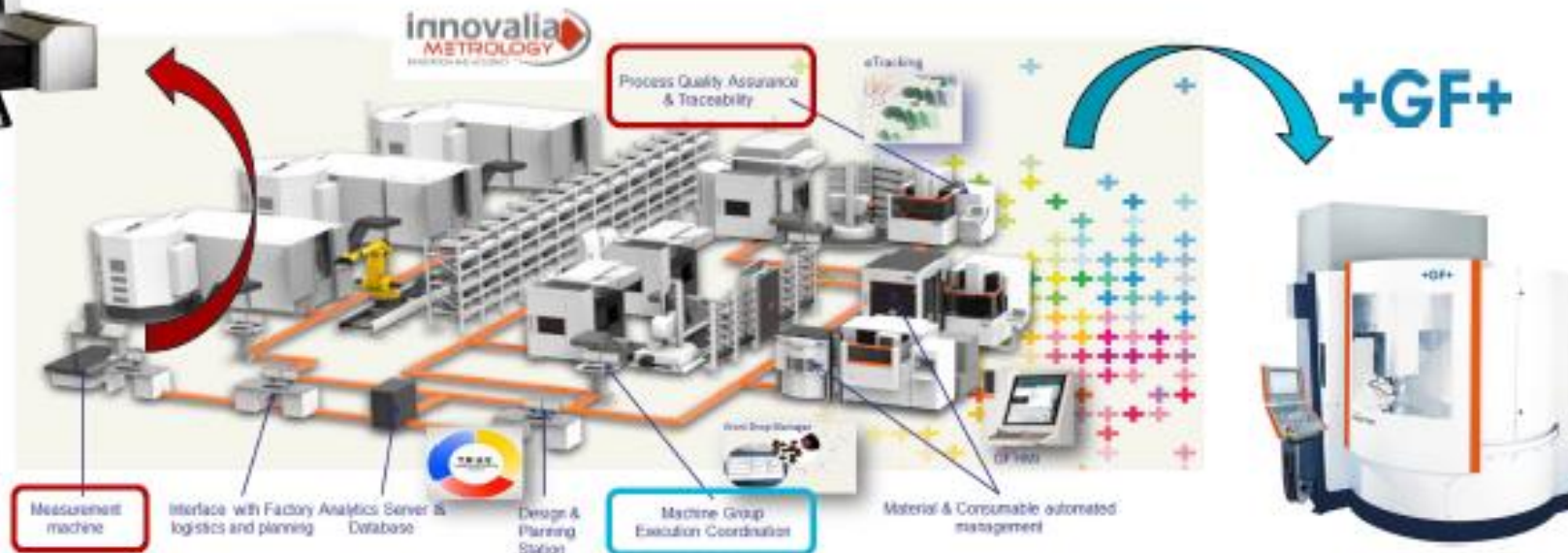


Advanced manufacturing processes incorporate several types of machines in the production chain like:

- **Milling machines**, producing objects by means of using rotary cutters to remove material from a workpiece of raw material
- **Coordinate-Measurement Machines (CMM)**, for measuring the physical (dimensional) geometrical characteristics of manufactured objects in order to detect defects, etc.

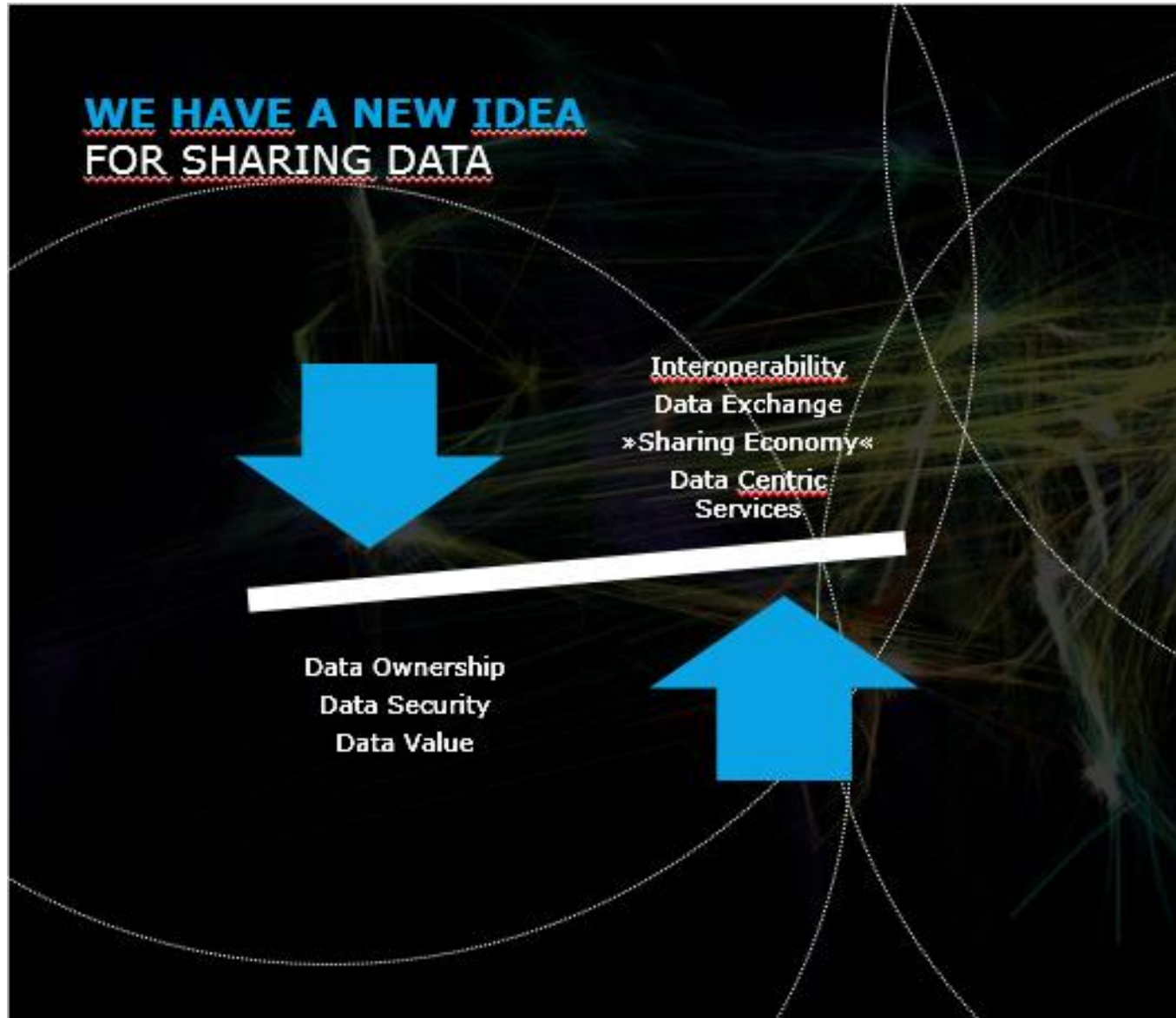


TRIMEK



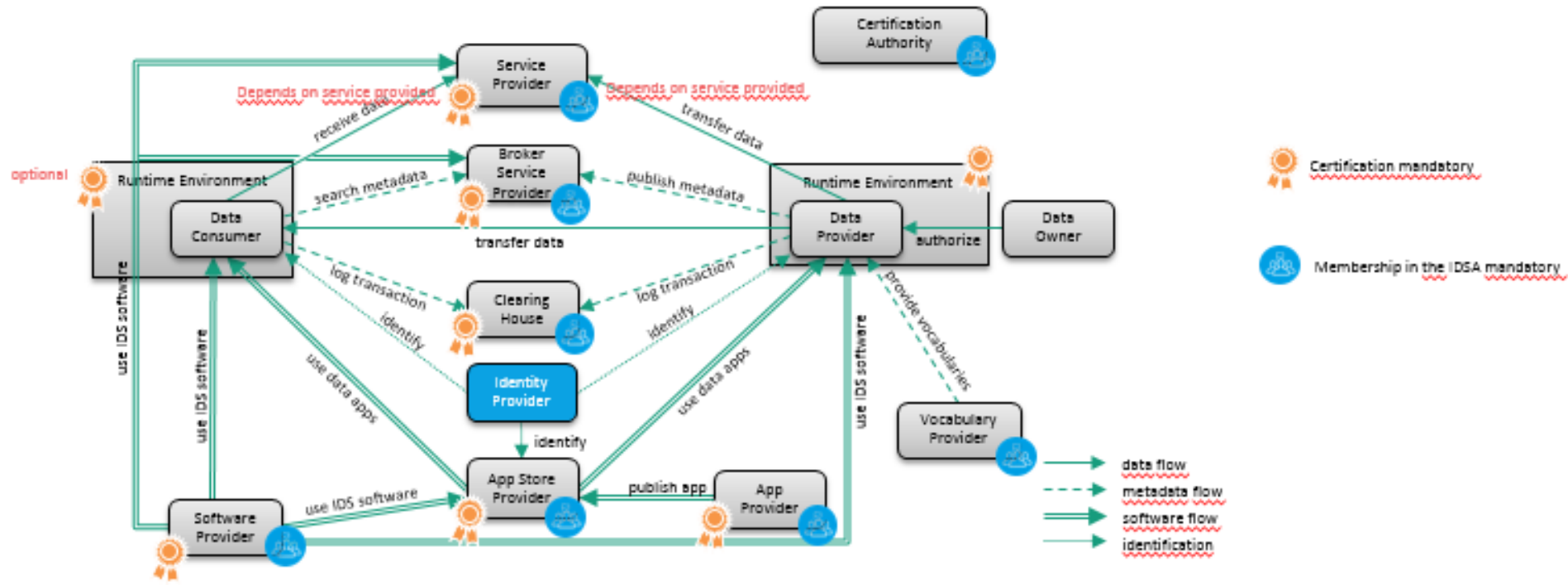
Boost 4.0
BIG DATA FOR FACTORIES

Industrial Data Space for Data Economy value chains



DISTRIBUTED GOVERNANCE IN THE INDUSTRIAL DATA SPACE ECOSYSTEM

Industrial Data Space				
Layers	Perspectives			
Business				
Functional				
Process				
Information				
System				



THANK YOU



BDV BIG DATA
VALUE

Sergio Gusmeroli

Engineering Ingegneria Informatica S.p.A

sergio.gusmeroli@eng.it