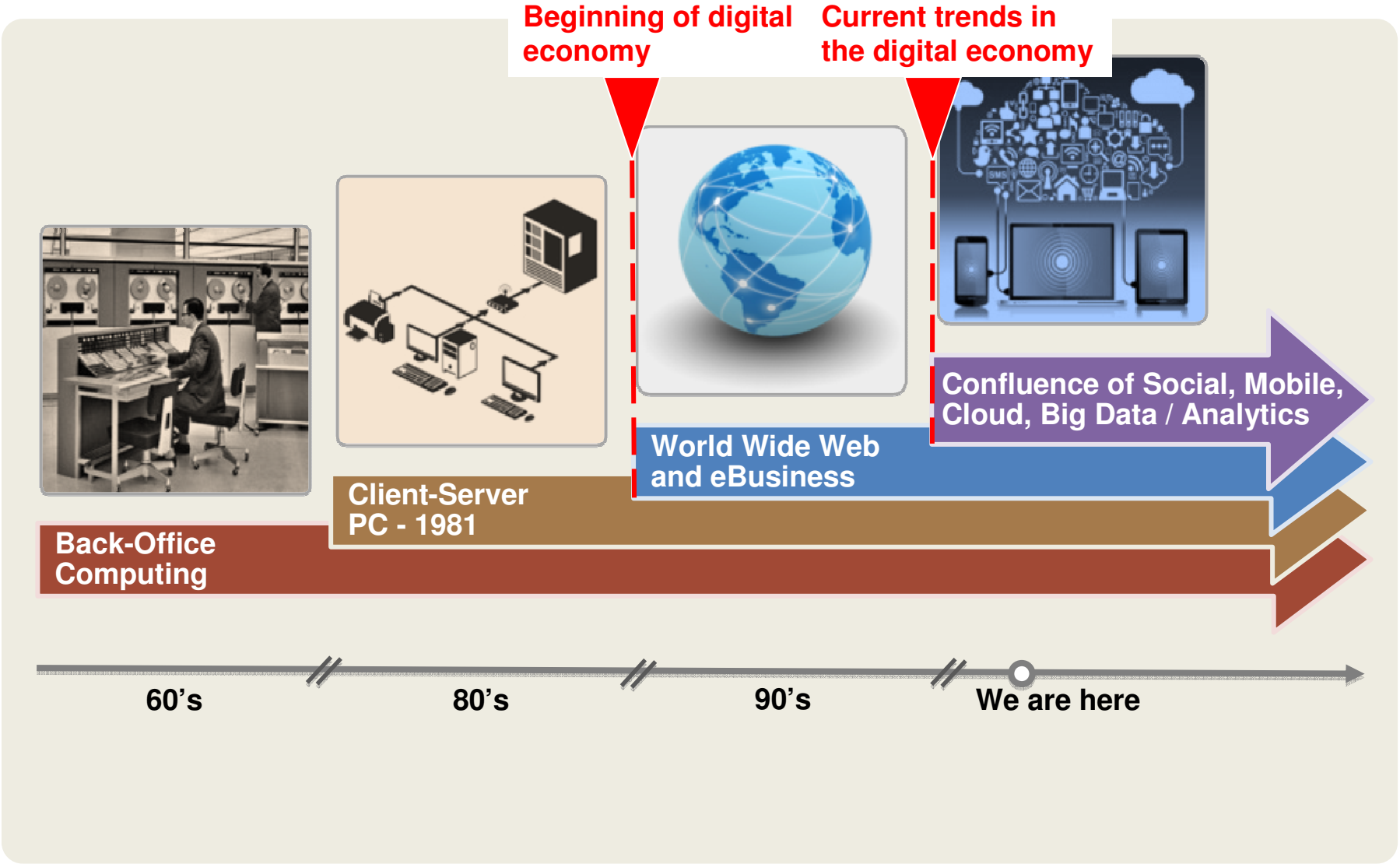
Industrie 4.0

#Industrie40

Innovate, 13. November 2013

Mark Mattingley-Scott, Ph.D.

What is the digital economy? It is a technology driven process that continues to evolve.



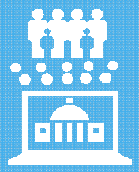
Over the next 12 years the digital economy will become *the economy.*

- Customers become more connected
- Consumers and employees will demand more capabilities
- Organisations will get flatter and more agile
- Enterprises will make faster, more data-based decisions
- Enterprises will face more sources of competition

Underpinned by a heavy reliance on data

Enterprises will be faced with a choice between a virtuous cycle of growth or rapid decline

Compounding influence: small gains early on compound to become significant differences – and it will be almost impossible to catch up



Public sector will see improved services: if it can reduce costs whilst increasing reach through new digital business models

Need to re-skill our workforce: we need to develop new areas of business and grow exports to create new, high-paying jobs

Ready access to a broad set of data and affordability of computing is enabling a new IT paradigm: Contextual Computing

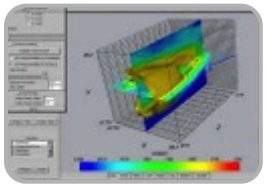
This shift is now in full swing and will play out over the next decade.

People freely share their sentiments, expertise, desires, and intentions via social media.

Social Media

Social Business

Advanced analytics exploit rich context for dramatic new insights and predictions.

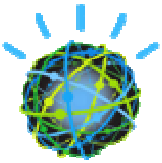


Open Data and Open APIs start delivering breakthroughs in access and integration.

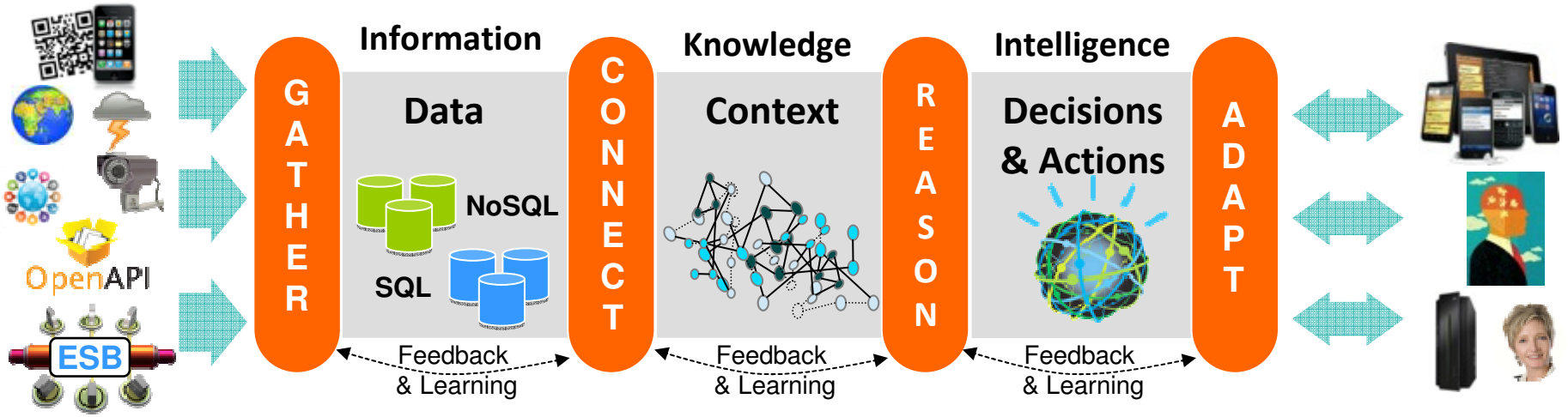
Open Data

OpenAPI

WATSON-style guidance is generated from massive stores of contextualized data.

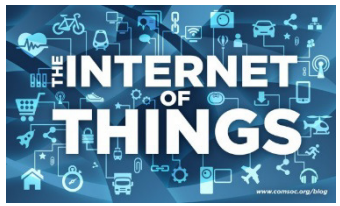


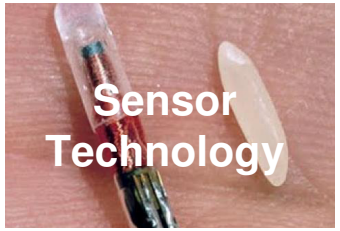
The Contextual Enterprise will dynamically build and accumulate context at scale from data sources to deliver new client value

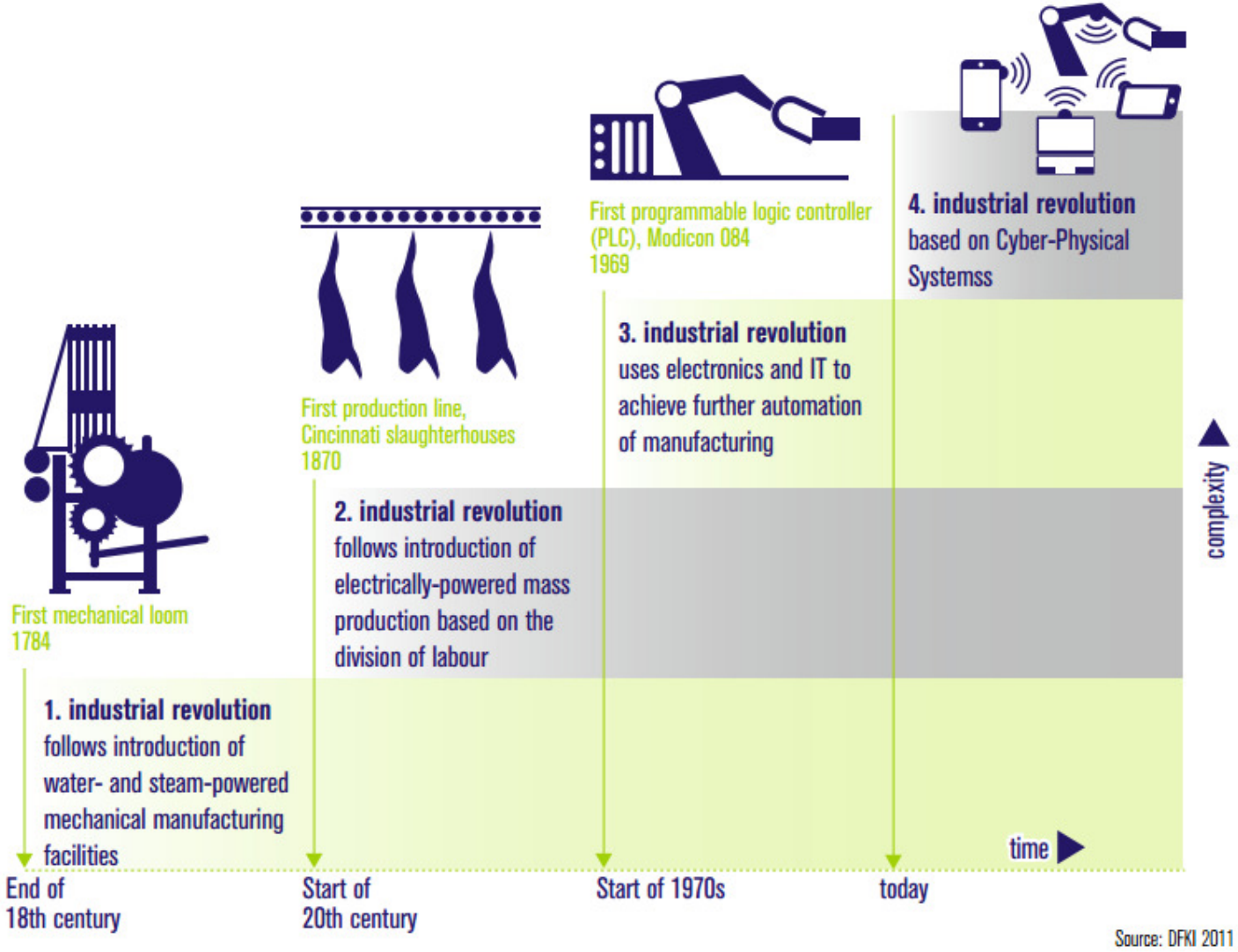


Support for pervasive data-centric security, data federation, and latency appropriate delivery will be key competitive differentiators

Industrie 4.0 is an ongoing technological development influenced by four factors.







Industrie 4.0 will move the manifacturing industry towards a service business model.

Large german car manufacturers generate more than 50 percent of revenue from aftersales

Trend towards service

In Manufaturing there are two sucessful strategies, be the price leader or the quality leader.

Manufacturing Business Model is limited

Industrie 4.0 is the enabler for the transformation from a manufacturing to a service business model

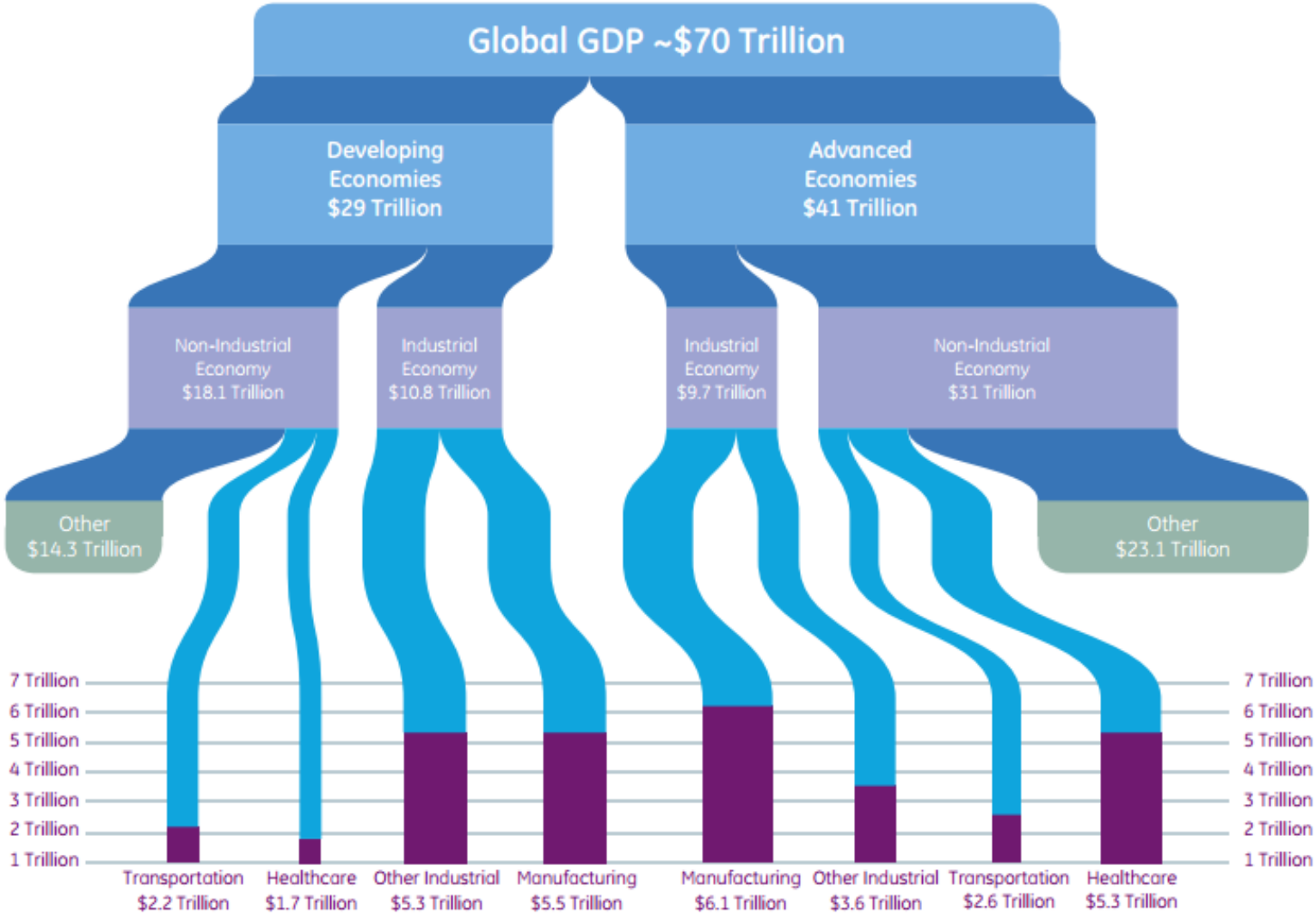
Apple did the transformation:

What do Bosch, BMW or Gillette need to do this?

?

Source: Accenture

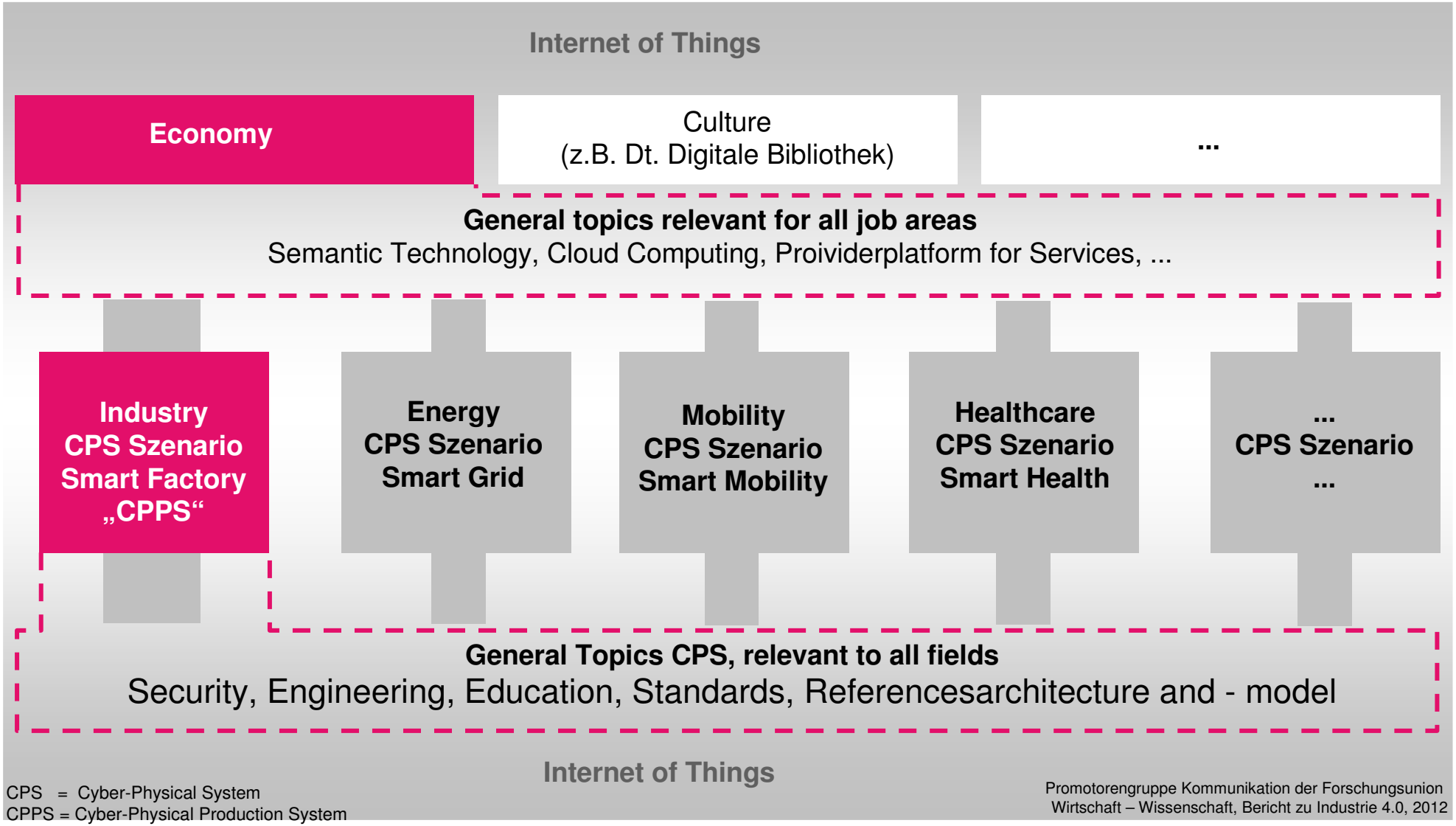
Industrie 4.0 ("Industrial Internet") opportunity ($32.3 Trillion) 46% share of global economy today.



Industrie 4.0 Opportunities

Source: World Bank, 2011 and General Electric

Industrie 4.0 is a project for the future and is related to other inicatives and projects



CPS = Cyber-Physical System
CPPS = Cyber-Physical Production System

Promotorengruppe Kommunikation der Forschungsunion Wirtschaft – Wissenschaft, Bericht zu Industrie 4.0, 2012

The technology to realize this architecture is available to us right now!

Application

Business requirements define the benefit

Production and performance reporting

Condition based monitoring

Intelligent alerts & event management

KPIs and production calculations

Collaboration for decision making

Integrations Assets

Technologies to realize the integration infrastructure and the semantic appliance.

Reference semantic model

Global standards

Smart SOA with collaboration

Configurable event rules engine

Visualization in context of process

Installed Based

Legacy production systems and model based integration

Facility monitoring & MES apps

Rotating equipment monitoring

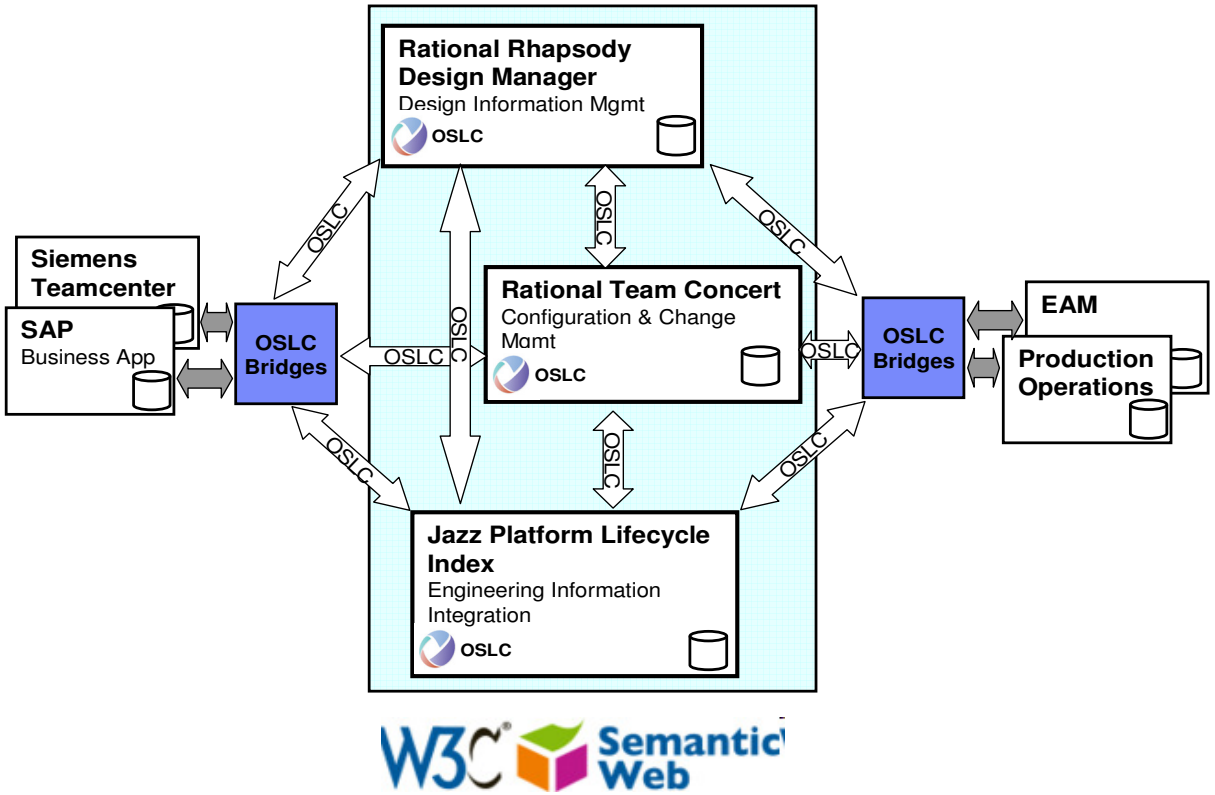
DCS, PLC, & historians

Engineering systems

Maintenance & asset mgt

Equipment & process documentation

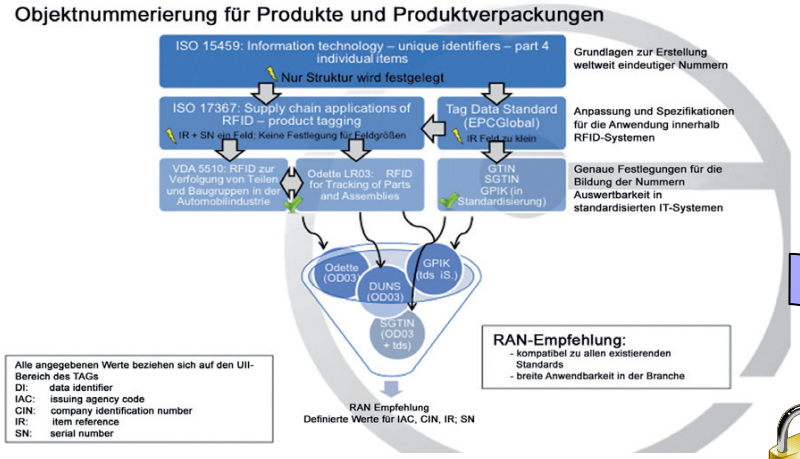
This also enable integrated lifecycle mangement for CPPS by the semantic integration based on open services for lifecycle collaboration



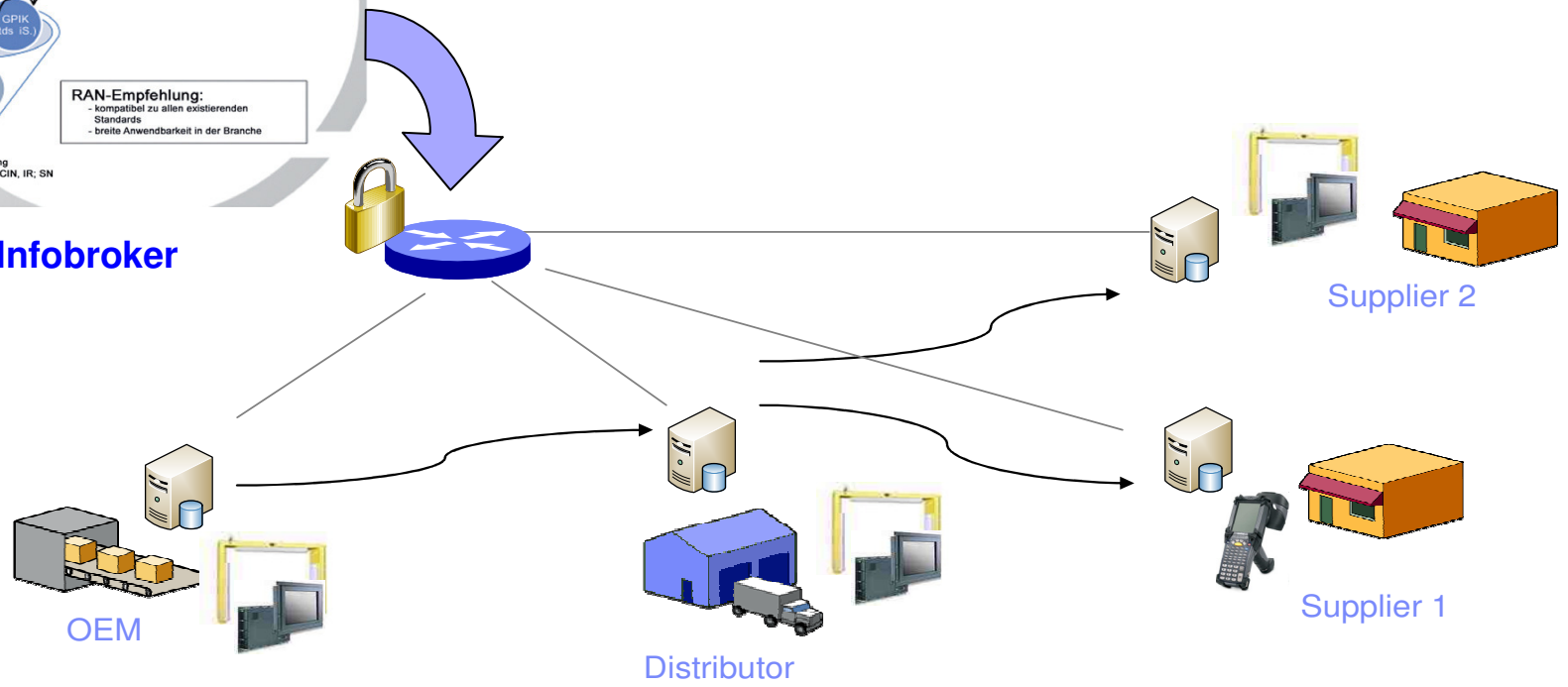
- **Explicit formalized Relationships between the data of different tools and applications**
- **Standardized semanticly descripted inteface.**
- **Masterdata stays in their current application, no transfer**
- **Queries, view-generation and backtacking across different tools and systems**

OSLC enables semantic integration of data over different tools and application today.

This also enables a smarter logistics solution based on RFID and creating transparancy of parts, products and containers.



- **Based on accepted standards**
- **Defined and accepted semantics and taxonomy**
- **Big value potential**



The solution that has been developed for the automotive industry can be use for (spare) parts and enable the dynamic reconfiguration of the supply chain.

Overview of an industrie 4.0 solution.

Today available:

✓ Integrated development environment for products, facilities and enterprise-it-applications (JAZZ / RELM / RDM).

✓ Semantic reference model for line control (IIC) and management (IOC) systems

✓ Reference models and tools for development of systems to analyse the data (“big data”, “unstructured data”) and to optimize complex production facilities (PAO)

✓ Components for „Service-Plattorm“ („core technology services“ like scalability, performance, integration of intelligent devices, connectivity, etc. and „core business services“ like product- and process documentation, tracability, data security, safety, protection of IP and privacy „Web-of-Trust“, system for user and rights management and billing, ...)

✓ Platform for collaboration and knowledge management (Lotus Connections)

✓ Process support and operations („cloud computing“, „AMS“, „market place“, ...)

Improved industry and manufacturing is a global competition, with initiatives in the USA, China and Germany

	USA	China	Germany (EU)
1 **Status quo**	• Revenue in Manufacturing: 290 Mrd. Euro p.a. • Industrial employment decreased by 25% since ‘02 (slow recovery) • Leading in Internet Technology	• Revenue in Manufacturing: 563 Mrd. Euro p.a. • Strong manufacturing growth plans • Leading in Automation (30% vs. 10% market share)	• Revenue in Manufacturing: 250 Mrd. Euro p.a. • High ITC and manufacturing competence
Conclusion	**Highly competitive** landscape, the **innovation in manufacturing** (Industrie 4.0) is the key to survival		
2 **Advance Manufacturing Initiatives**	**„Advanced Manufacturing Partnership“** • Start: 2011 • Goal: Connect Industry, Science and Politics • Led by top research institutions (e.g. MIT, Stanford) and CEOs (e.g. Ford, Intel, P&G) • R&D Budget: 2,2 Bil. Dollar (in 2013)	**“12th five-year plan (2011-2015)”** • Start: 2011 • Goal: Decrease foreign dependencies in strategic industries (High-End Equipment Manufacturing/ New-Generation Information Technology) • R&D Budget: 1,2 Tril. Euro (until 2015)	**“Industrie 4.0 / Horizon 2020”** • Start: 2011 / 2014 • Goal: The development and market introduction of the smart factory • R&D Budget: 200 Mil. Euro (for Industrie 4.0) / 80 Bil. Euro (until 2020)
Conclusion	**Governments invest heavily to secure the competitive advantage. Companies can use this government backing to get involved with Industrie 4.0 with limited exposure to risk.**		

Source: Industry analyst reports; Umsetzungsempfehlung fuer das Zukunftsprojekt Industrie 4.0

Contact

Dr. Mark Mattingley-Scott

Lead Architect for Big Data & Industrie 4.0

Altrottstr.31
D-69190 Walldorf

Mobil: +49-1511 634 8675
Mail: scott@de.ibm.com

Twitter: @m0mms