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Digitalizations needs Interoperability
Interoperability needs Standardization

The way to do it!

Thomas Hahn, Siemens AG, 23.11.2017

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New business models in the internet age are disrupting complete markets

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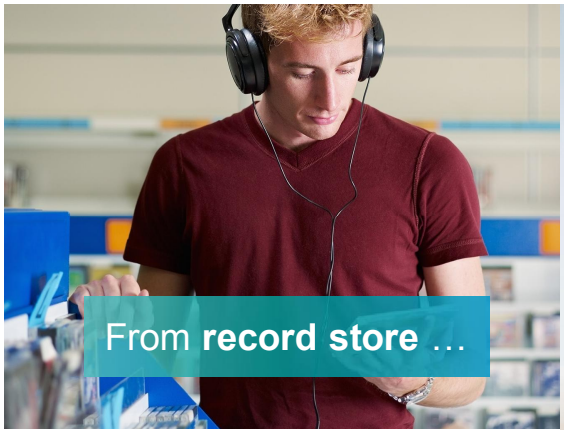

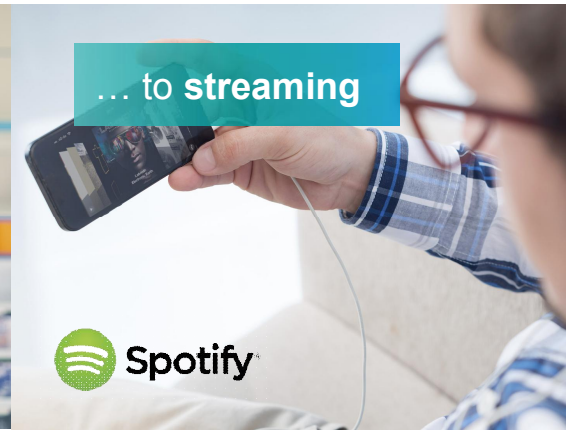

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We are seeing increasing Digitalization of manufacturing industries

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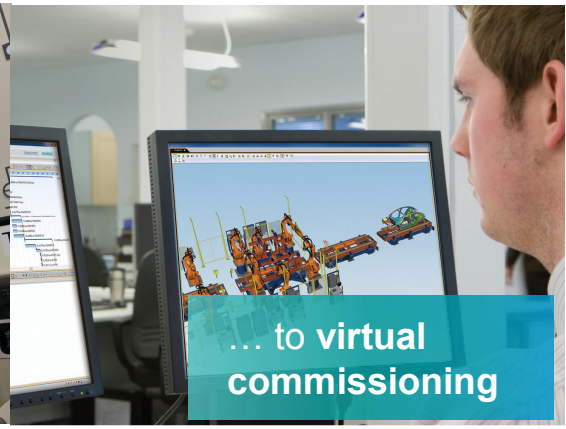

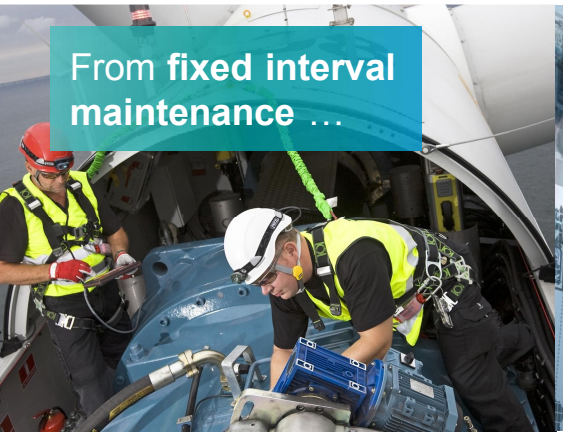

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Easy to digitalize industries have already started to change …
… more complex industries will follow

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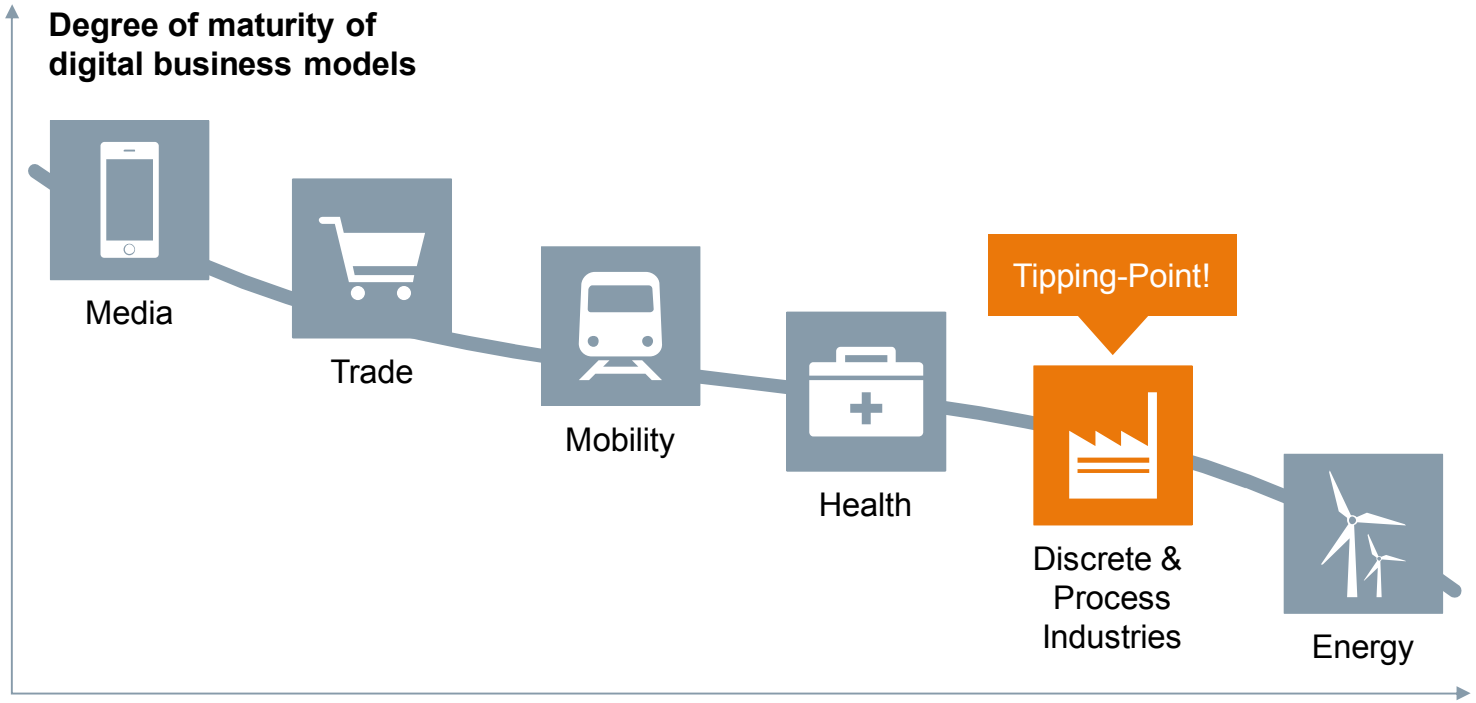
1 Technical Drivers

Digitalization, Sensors, Connectivity, Bandwidth, Computing Power, Data Capturing and Storage, Clouds, Analytics …

2 Business Drivers

New Business Models, Ecosystem concept and Paradigm shift: From product-focused to user-centric mindset …



Source: Based on "Smart Service Welt" report/Accenture visualization

We're seeing an increasing Digitalization of industries

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Example: Health check for CERN's Large Hadron Collider
Data analytic supports availability of systems

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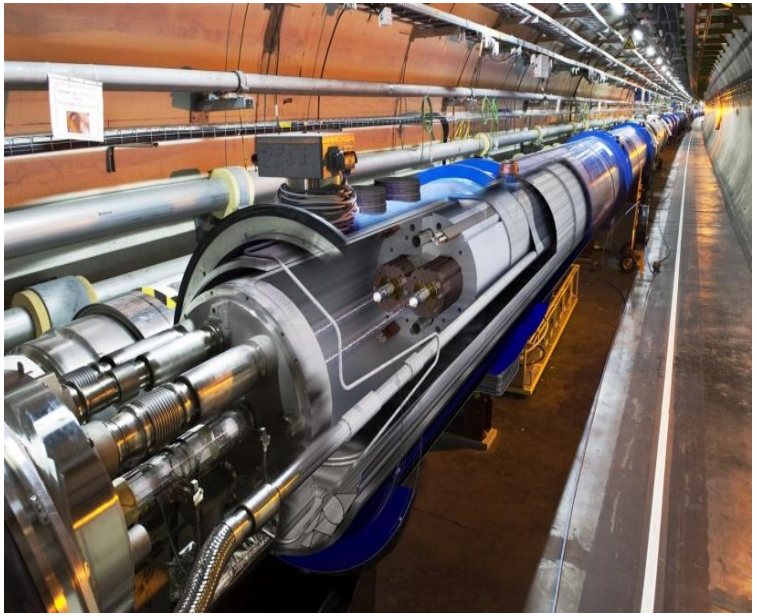

99.9999991% the speed of light

The biggest detectors ever …

… 7,000,000,000,000,000 proton-proton collision in 2016

Huge supervisory system and hundreds SIMATIC systems controlling the production

With rule and pattern mining methods increase operating hours

Source: CERN

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Automatic and scalable search for causes of errors in complex, incomplete and heterogeneous data streams

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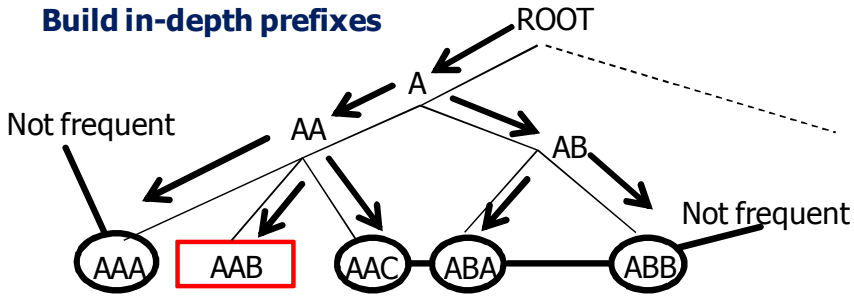
Analyse

Identify and recognize errors / unusual patterns for diagnostics and prognosis purpose

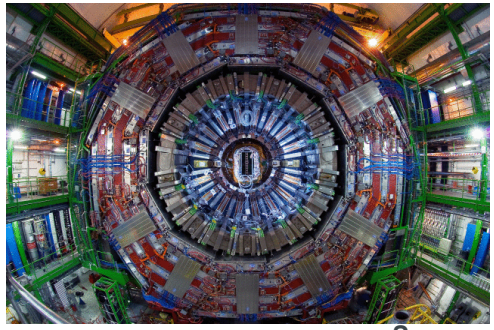
Learn



Help experts to analyze the causes and weaknesses by rule and pattern mining methods

Predict

Forecast, trends, and early warnings to increase operating hours



Source: CERN

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Example: Improved efficiency of wind parks (Project ALICE*)
Data analytic supports optimization

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More than 200 GB of sensor data
sensors from ≈ 7.800 wind parks
Early detection of divergent behavior

Autonomous learning with Neural Networks

Common research project:
Siemens, IdaLab GmbH, TU Berlin

➡ **1-3% increase of annual energy**

* ALICE = Autonomous Learning in Complex Environments

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Example: NOx emission reduction of gas turbines
Data analytic supports emission reduction

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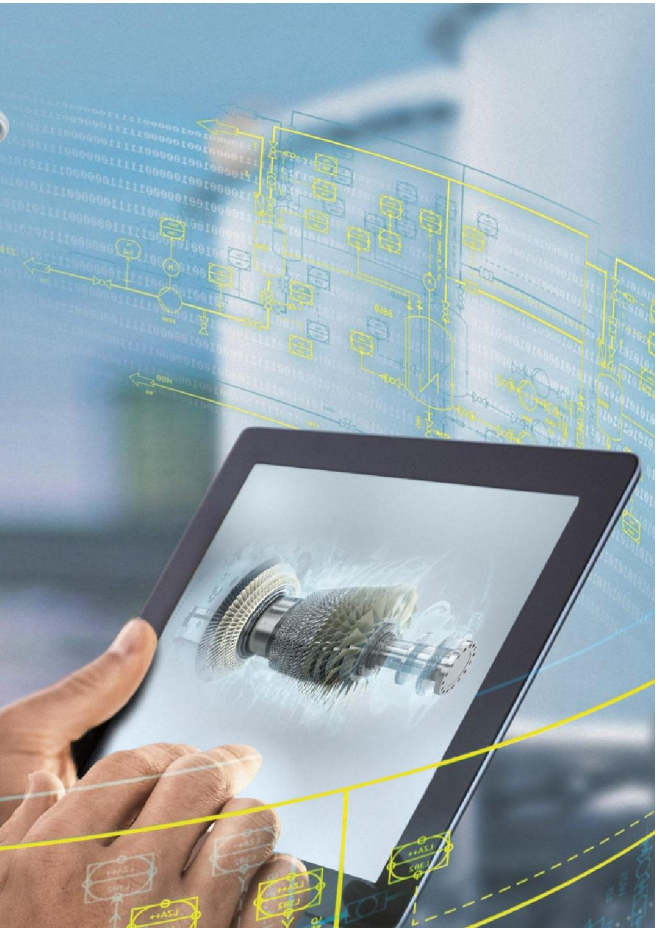

Conventional NOx emission reduction approaches reaching limits

Tightening environmental regulations

Machine learning algorithms for optimization of control parameters is used

➡ Gaining 15–20% additional NOx reduction and providing more sustainable balancing power

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Autonomous learning to improve efficiency of systems

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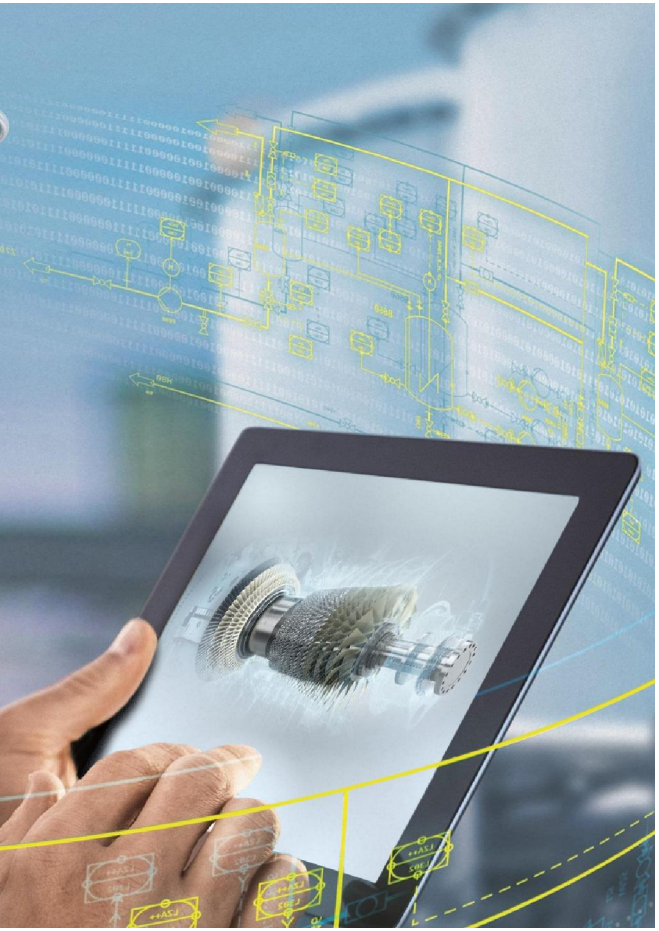

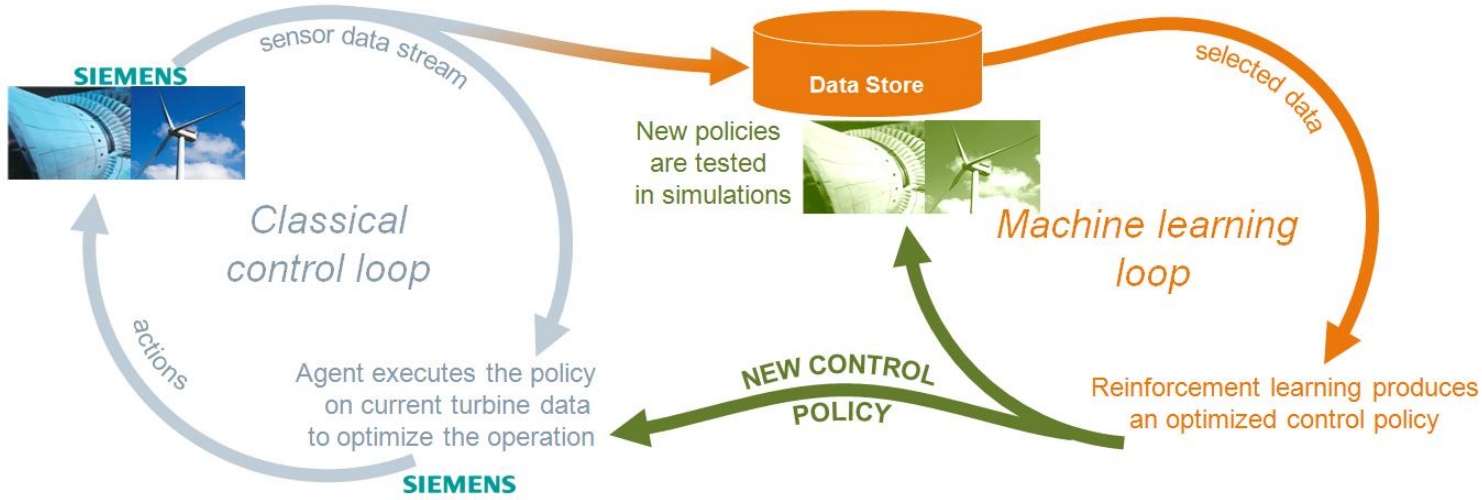

15-20% additional
NO_x reduction

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The „zoo“ of consortia and platforms for Industrie 4.0/IoT gets more and more complicated

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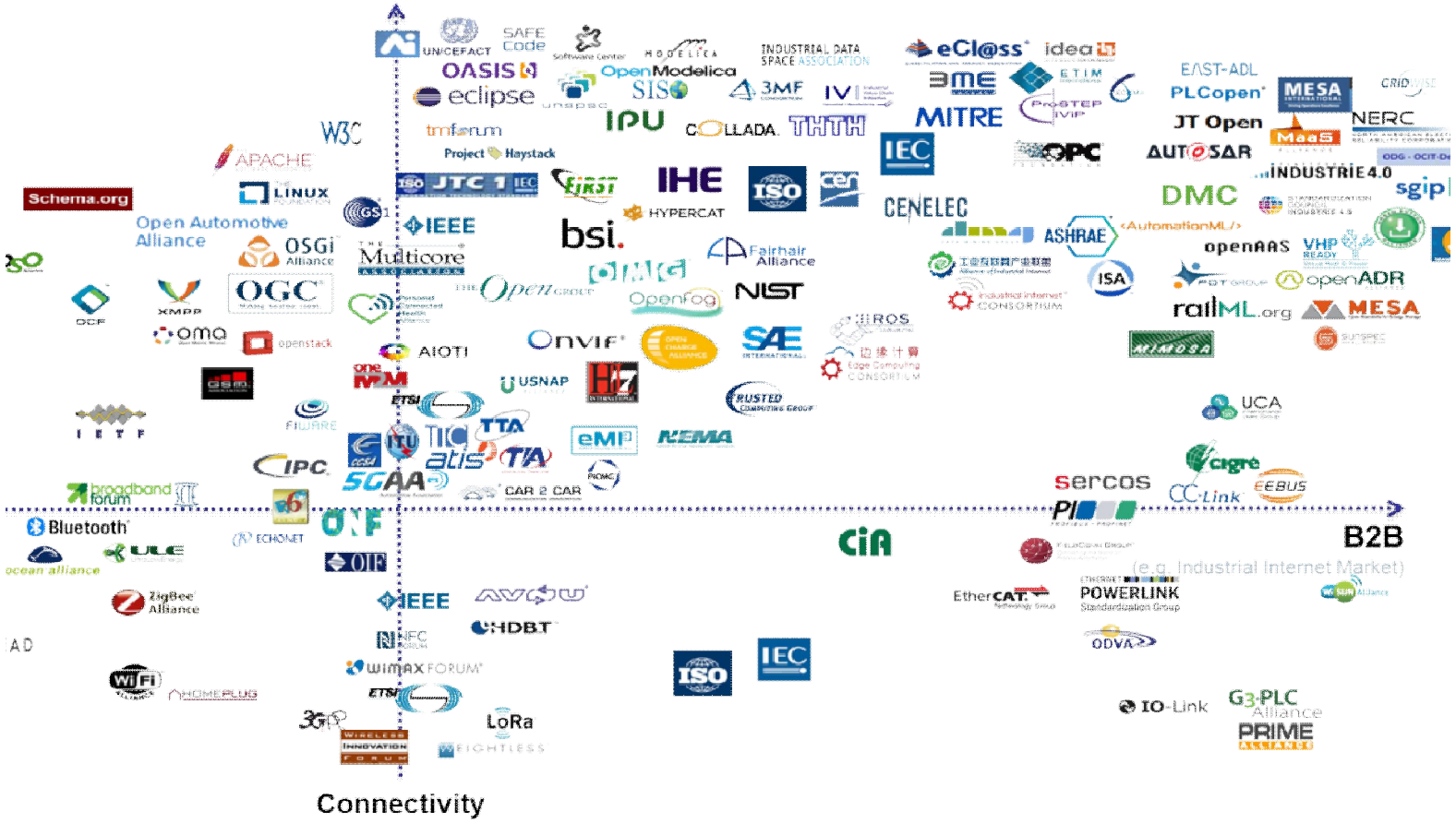

Source: AIOTI

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Setup of a strong triangle for Recommendations, Testing and Standardization

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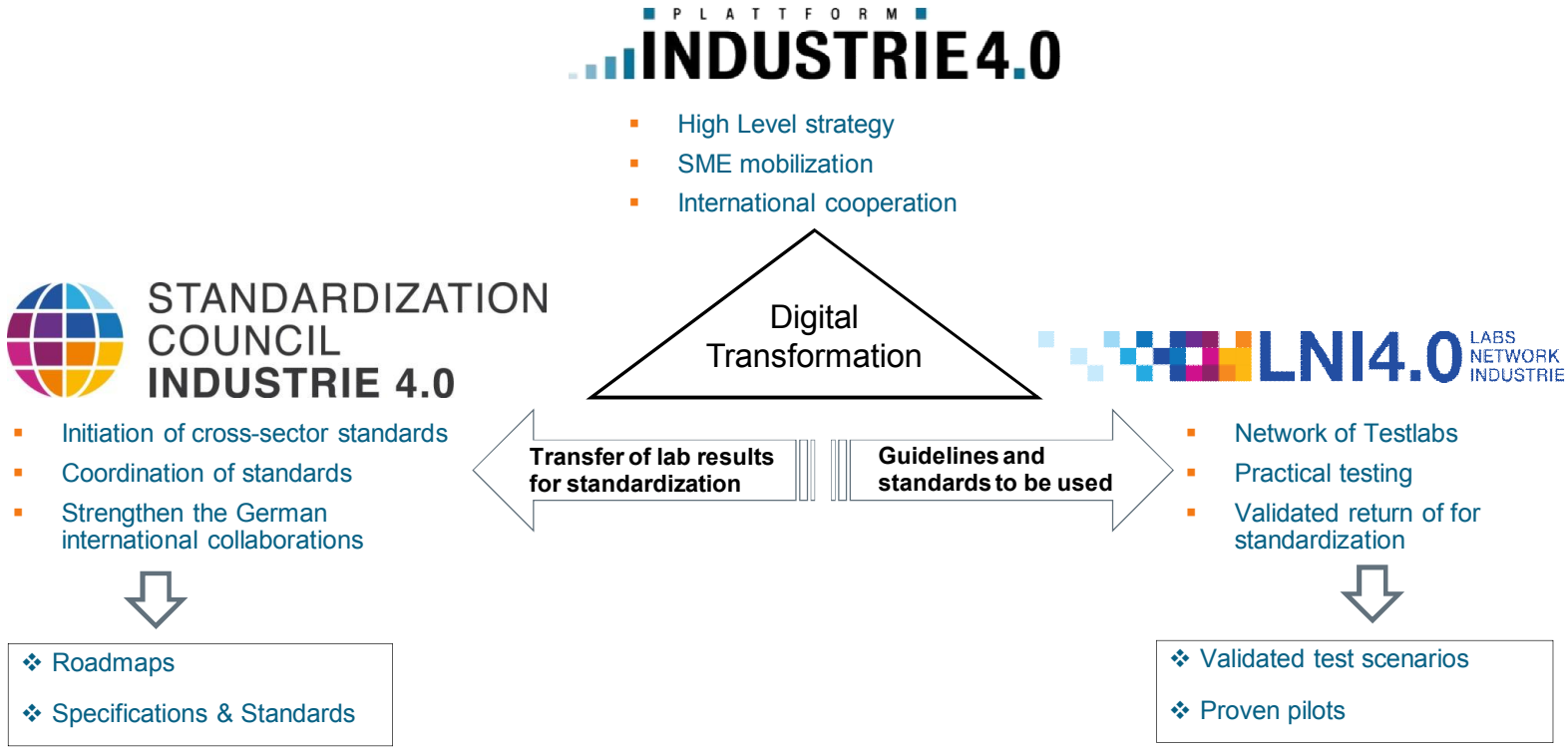

Source: Labs Network Industrie 4.0

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Example: Plattform Industrie 4.0
Germany's approach to drive the fourth industrial revolution

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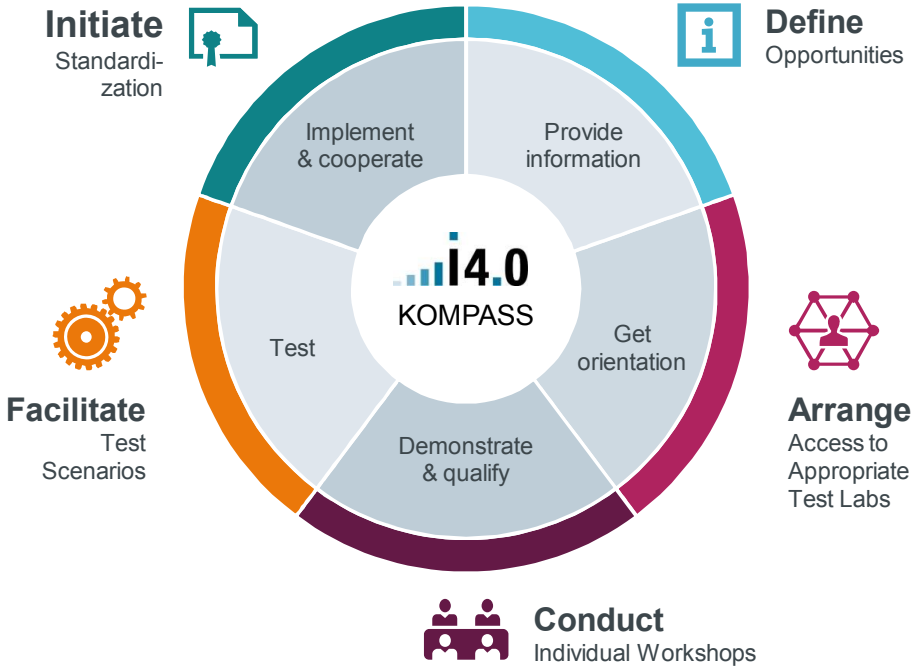
PLATTFORM INDUSTRIE 4.0

Building on the strengths
of the German industry and SMEs

Close cooperation among the private sector, academia, politics, trade unions and associations on five thematic priorities:

Reference architectures, standards and norms 1	Research and innovation 2	Legal framework 3
Security of networked systems 4	Work, education and training 5	



LNI4.0 LABS NETWORK INDUSTRIE 4.0 | STANDARDIZATION COUNCIL INDUSTRIE 4.0

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Plattform Industrie 4.0
Research and Innovation

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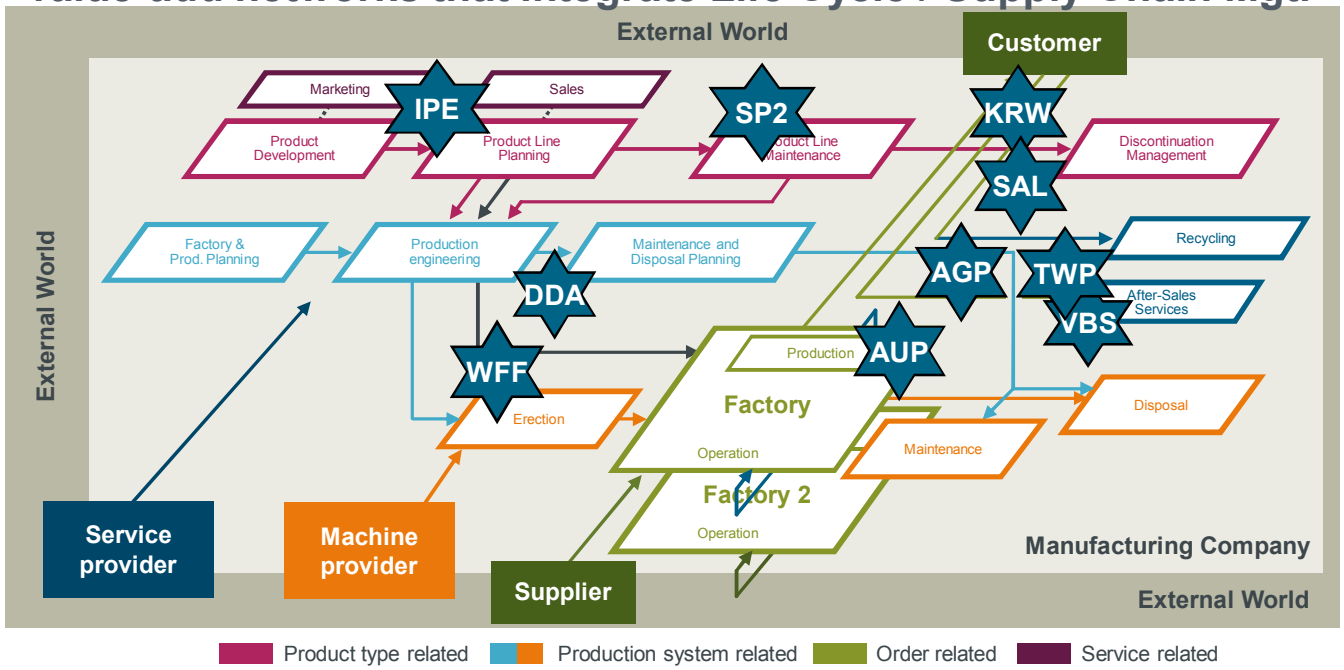
Industrie 4.0 scenarios

- Development and documentation of various scenarios regarding the future development of Industrie 4.0
- Criteria for the qualification of test-labs, recommendations for development of test-beds and CoE's
- Development of migration guidelines for the support of SME's

R&D-Roadmap and innovation strategies

- identify research and innovation requirements from the industry perspective and set priorities

Scenarios mapped on value-add networks that integrate Life Cycle / Supply Chain Mgt.



Source: Plattform Industrie 4.0 **Graphic based on:** GMA 7.21. (vdi Fachausschuss "Industrie 4.0")

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Labs Network Industrie 4.0 has relation with over 40 test labs in Germany … but also international active!

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Source: Labs Network Industrie 4.0

INDUSTRIE 4.0 TESTLABS

FH MÜNSTER University of Applied Sciences
SAP Co-Innovation Lab
VIRTUAL DIMENSION CENTER
ARENA2036
WILDAU
IHK
TECHCENTER
Lufthansa Industry Solutions
CETECOM
DHBW
HTW
FZI
SCHMERSAL
FAU
NEC
tec.nicum excellence in safety
Smart Data Innovation Lab
TWENTY54LABS
evosoft
UniTransferKlinik Lübeck
HSD
Universität Potsdam
Smart Electronic Factory
UNIKASSEL VERSITÄT
Fraunhofer IOSB

COMPETENCE CENTERS 4.0

Leibniz Universität Hannover
DEMOFABRIK AACHEN
smartFactory
Fraunhofer ESK
Technische Universität Braunschweig
Fraunhofer IGCV
DIGITAL IN NRW
Fraunhofer AISEC
FIR InnovationLabs
Fraunhofer IPA
OTTO VON GUERICKE UNIVERSITÄT MAGDEBURG
Smart Automation Lab
Mittelstand-Digital
TECHNISCHE UNIVERSITÄT CHEMNITZ
Smart FactoryOWL
PIW CiP

DIGITAL HUBS

unternehmertum
TUM
de:hub digital ecosystems

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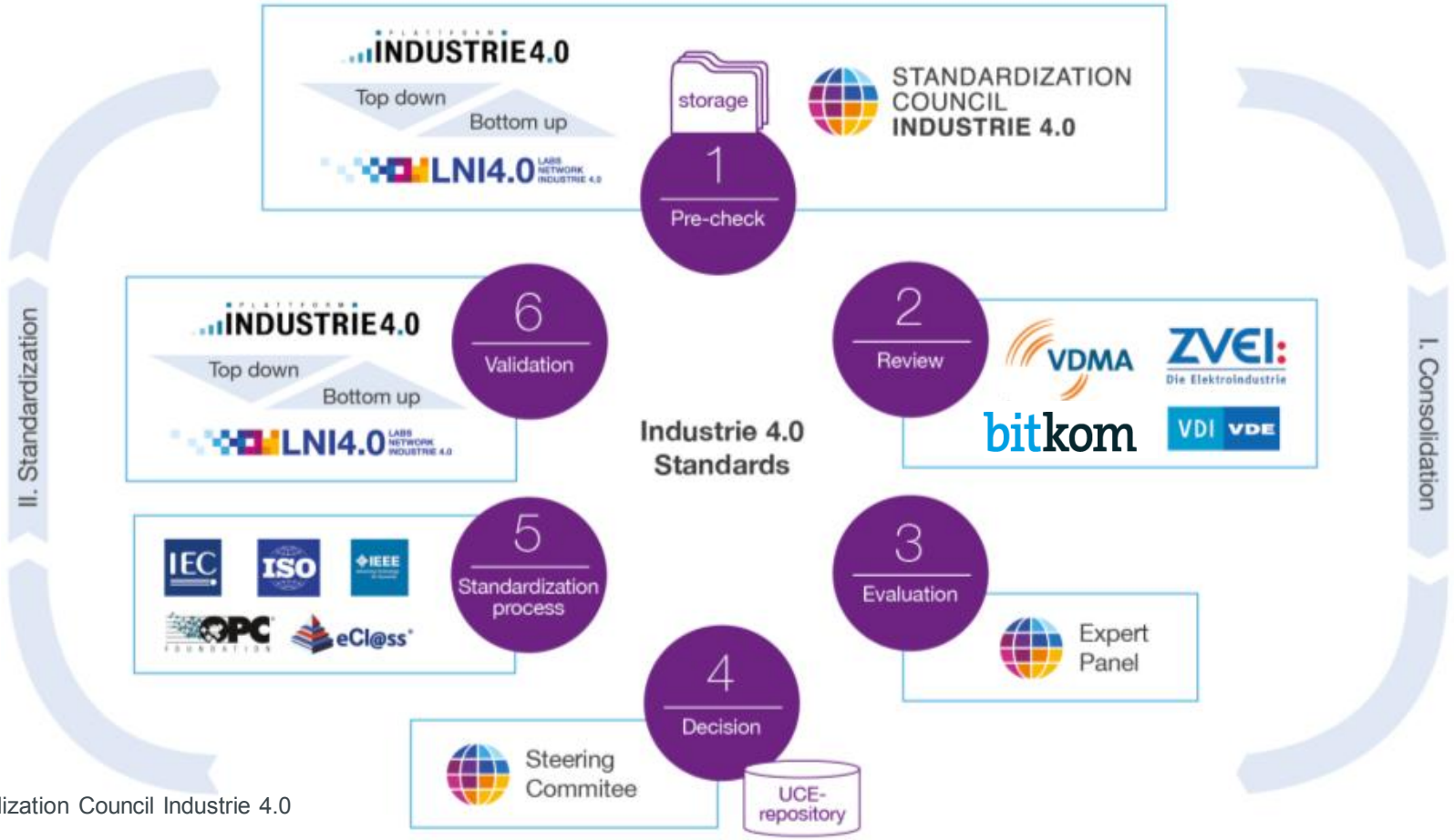
Process for standardization



Source: Standardization Council Industrie 4.0

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Factors for promising standardization work …

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- Industry-driven, consensus-based norms and consortium standards
- Existing standards remain in force
- Platforms to coordinate standards activities
- Standardization experts
- Collaboration of the different national platforms
- Framework for global standardization

THANK YOU!

Thomas Hahn, Siemens AG, 23.11.2017

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