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Ingenuity for life

IoT and Data Challenges

Thomas Hahn, Siemens AG | June 2017 | Geneva

Massive pervasion of technologies driven by exponential growth of computational power are enablers for digitalization

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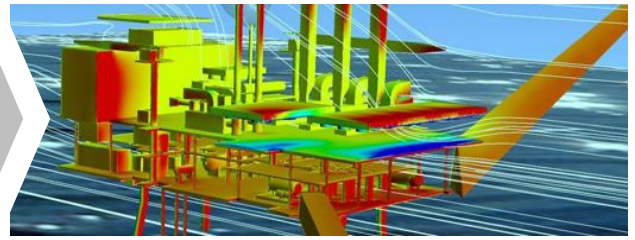
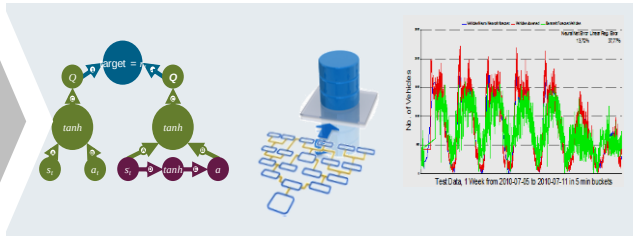
Communication
and
Connectivity

Modeling
and
Simulation



Autonomy
and
Intelligence

Semantic technologies
And
Big Data



The availability of data and the possibility to get value out of the data is increasing rapidly

> 40 Zettabyte of data in 2020 expected …

≈ 20 Zettabyte machine generated data included

Source: Oracle 2012, IDC CEO Summit 2015, misc. internet

We address Digitalization with a holistic approach

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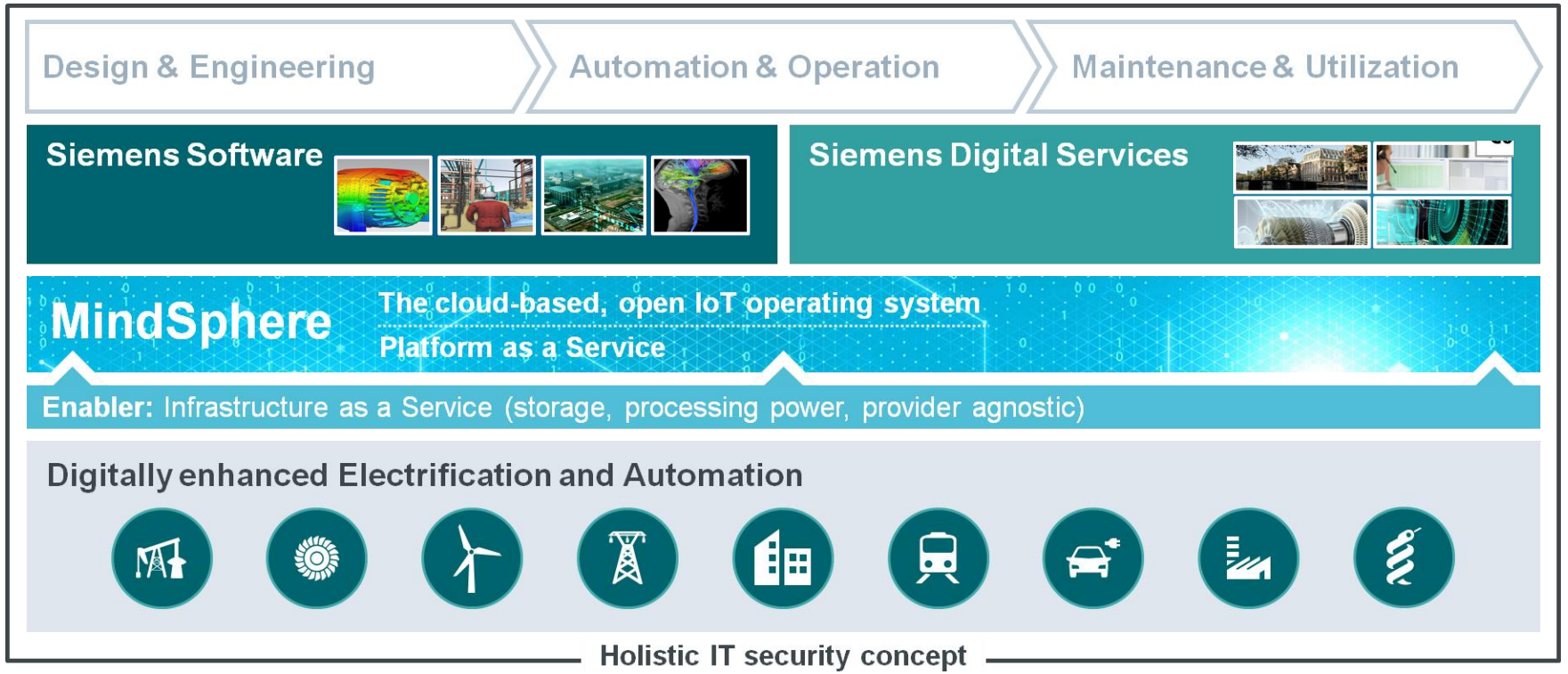
Value creation processes
Smart factory, smart plant

Digitally enhanced products
Smart products

Business models
Smart services



NOx emission reduction of gas turbines based on machine learning

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Challenge

- Conventional NOx emission reduction approaches reaching limits
- Tightening environmental regulations

Solution

- Machine learning algorithms for optimization of control parameters

Outcome

- 15–20% additional NO_x reduction
- Providing more sustainable balancing power

Achievements today – Self-Optimizing Gas Turbines learn to Reduce NoX Emissions

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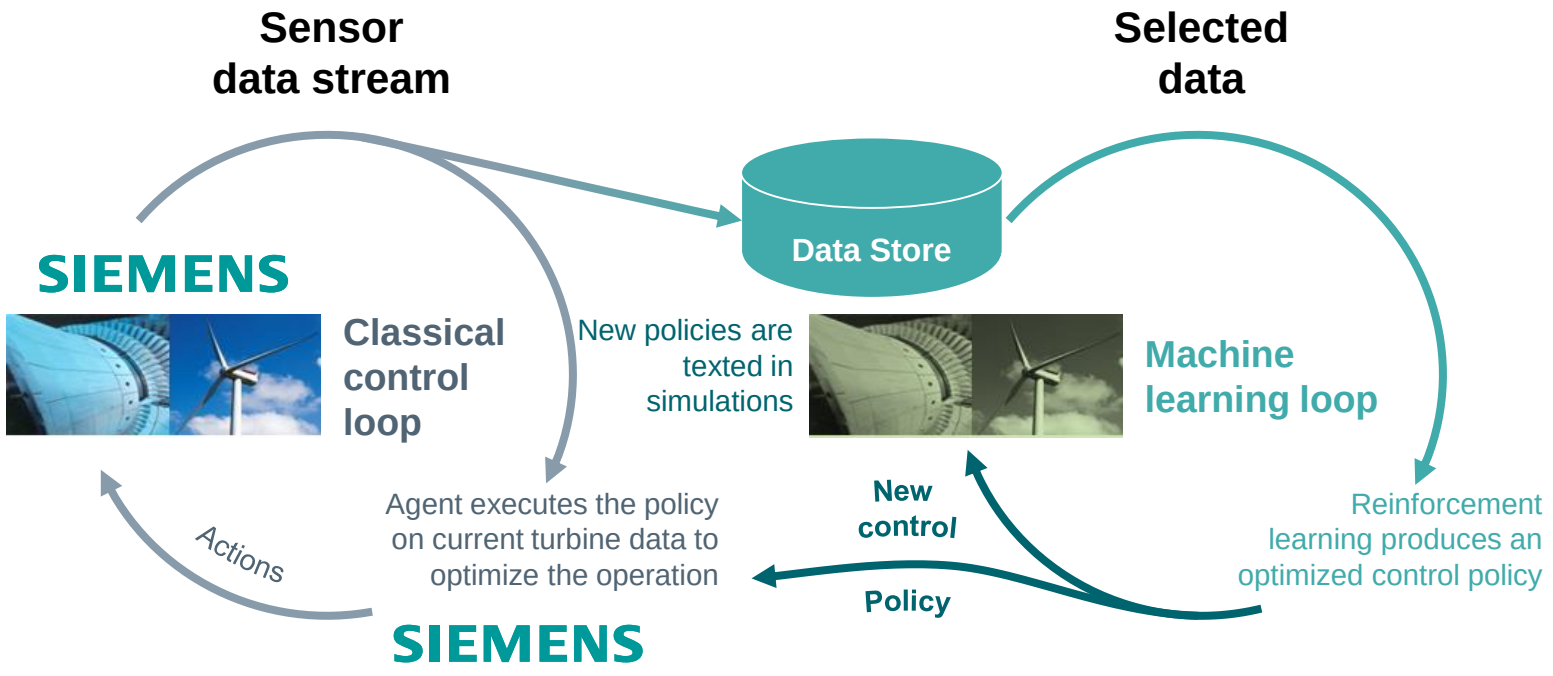

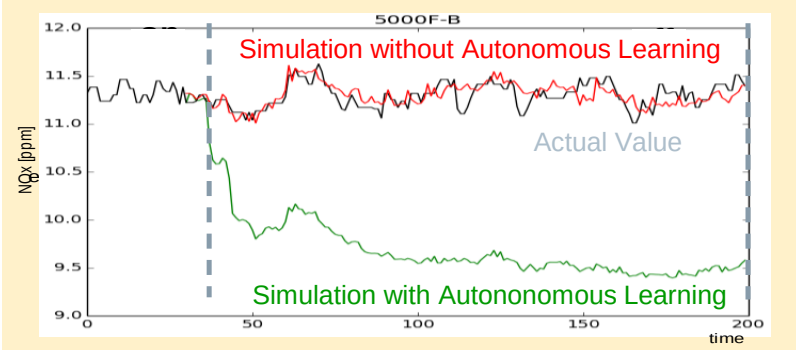

Product/use case details

- **Learn improved control policy** for emission reduction or better yield
- **Simulate the behaviour of gas turbine using neural networks**
- Optimize the policy using **reinforcement learning**
- **Deploy** improved policy on the turbine

Customer value-add

- **Emission reduction** of gas turbines by 10 – 15%
- Performance improvement achieved **without need for new hardware**

Data analytic supports availability of CERN's LHC

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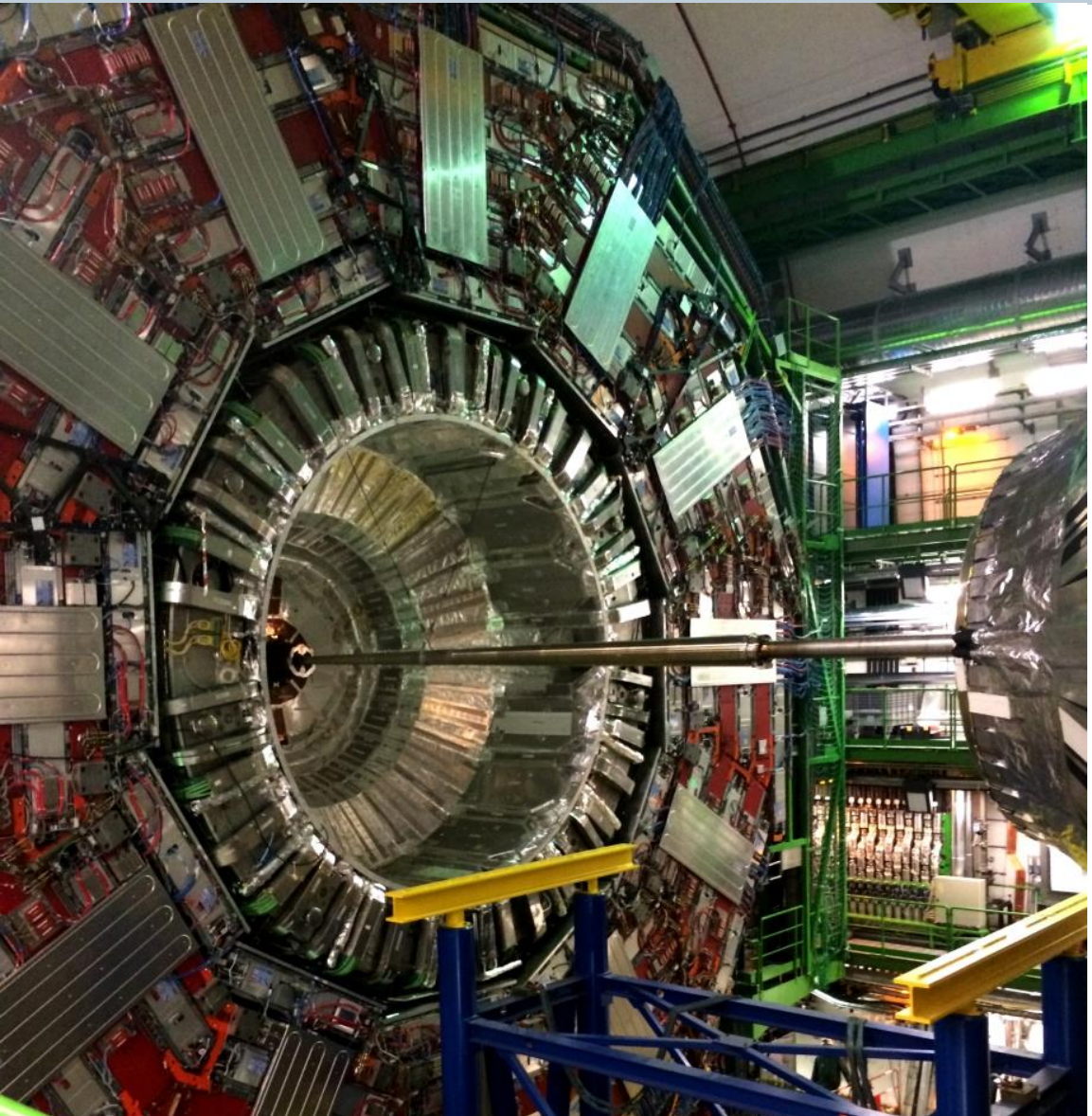

Challenge

- 99.9999991% the speed of light
- The biggest detectors ever …
- … 600 million collisions per sec

Solution

- Huge supervisory system and hundreds SIMATIC systems controlling the production
- With rule and pattern mining methods increase operating hours

Data analytics supports an automatic and scalable search for causes of errors in complex, incomplete and heterogeneous data streams

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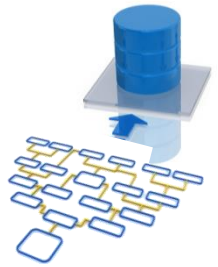
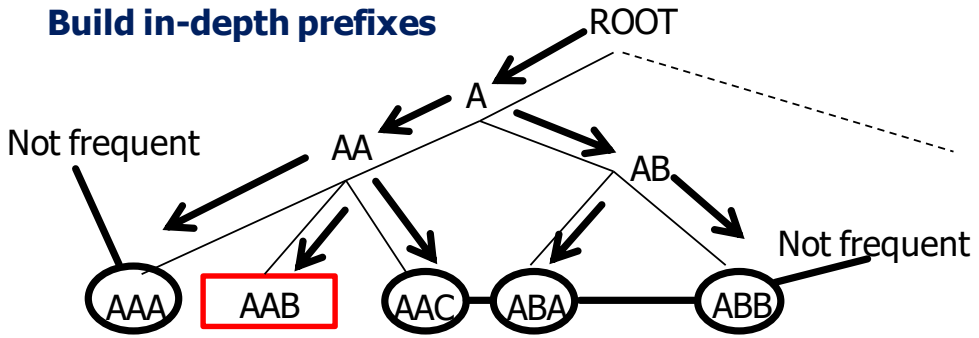
Analyse



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

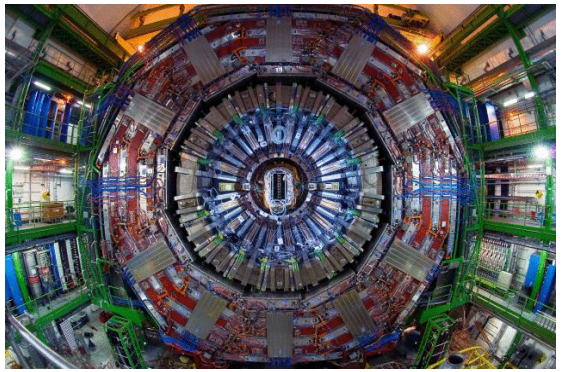
Learn



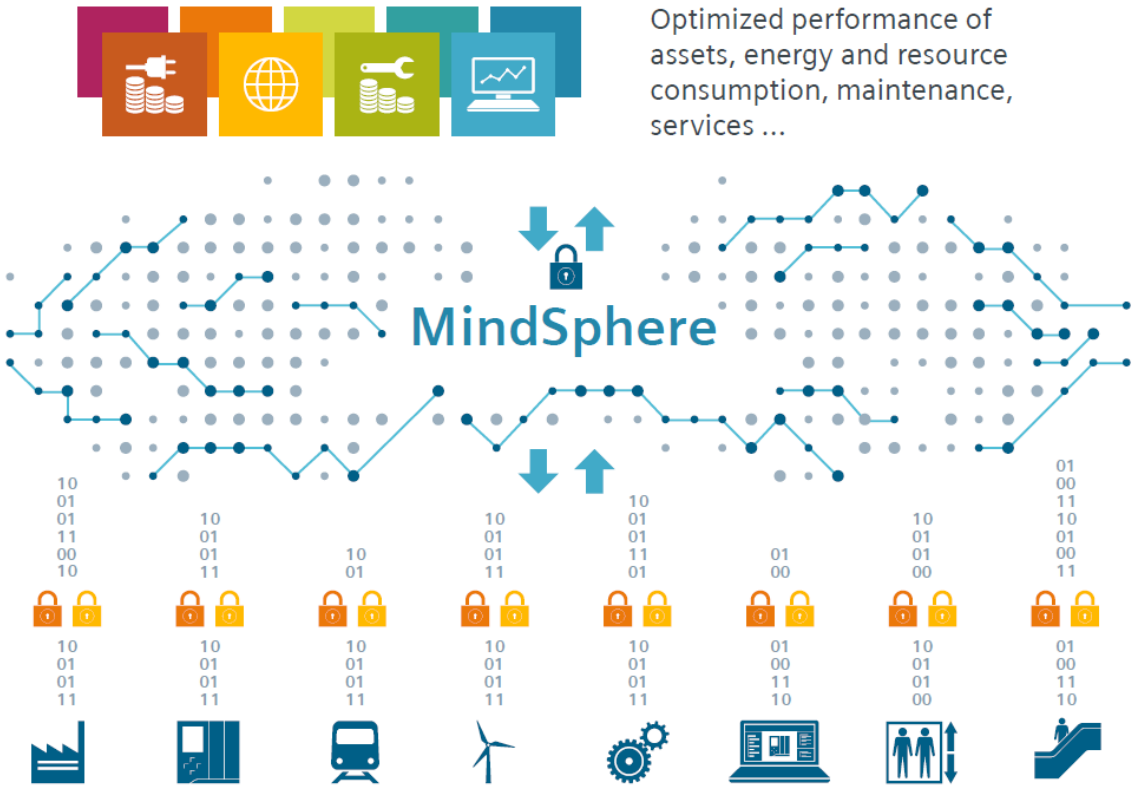
Help experts to analyze the causes and weaknesses by rule and pattern mining methods

Predict

Forecast, trends, and early warnings to increase operating hours



Siemens MindSphere – the cloud-based, open IoT operating system



MindApps

- Use apps from Siemens, partners or develop own apps
- Gain asset transparency & analytical insights
- Subscription based pricing model

MindSphere

- Open interface for development of customer specific apps
- Various cloud infrastructures: SAP, AtoS, Amazon Web Services, Microsoft Azure offered as public and private (planned)

MindConnect

- Open standards for connectivity e.g. OPC UA
- Plug & play connection of Siemens and 3rd party products
- Secure and encoded data communication

BDVA Vision

A future in which Europe is the world-leader
in the creation of Big Data Value

BDVA Mission

To contribute to the flourishing of Big Data Value in Europe by:

- Strengthening **competitiveness** and ensuring **industrial leadership** of providers and end users of Big Data Value technology-based systems and services,
- Promoting the widest and best uptake of Big Data Value **technologies** and **services** for professional and private use,
- Establishing the **excellence** of the **science** or base of creation of value from Big Data.

BDV BIG DATA VALUE ASSOCIATION

BDVA Focus areas

Data Innovation Recommendations

Providing guidelines and recommendations on data innovation to the industry, market and policy makers

Develop Ecosystem

Developing and Strengthening the European Big Data Value Ecosystem

Guiding Standards

Driving Big Data standardisation and interoperability priorities / Influencing Standardisation

Know-How and Skills

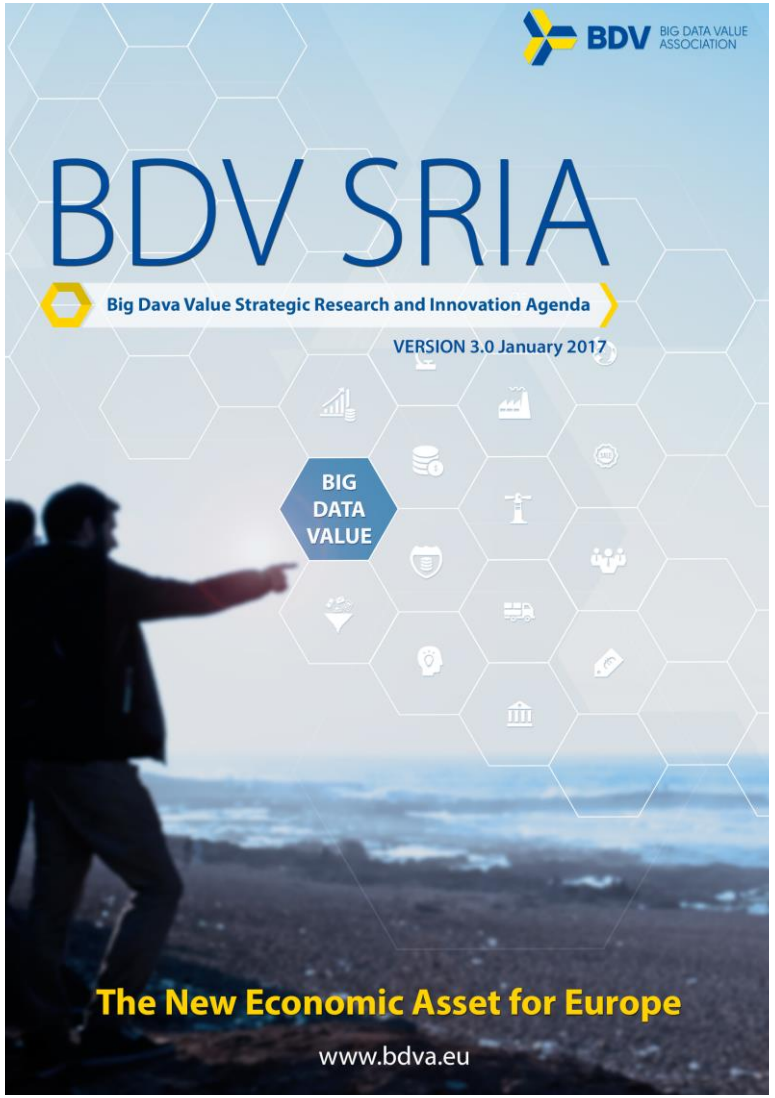
Improve the adoption of Big data through the exchange of knowledge, skills and best practices

BDVA SRIA
Strategic Research and Innovation Agenda

- The SRIA defines:
  - the overall goals,
  - **technical** and **non-technical priorities**, and
  - a **research** and **innovation roadmap**

  for the contractual Public Private Partnership (cPPP) on Big Data Value.

- The SRIA
  - explains the strategic importance of Big Data,
  - describes the Data Value Chain and the central role of Ecosystems,
  - details a vision for Big Data Value in Europe in 2020,
  - analyses the associated strengths, weaknesses, opportunities and threats, and
  - sets out the objectives and goals to be accomplished by the cPPP within the European research and innovation landscape of Horizon 2020 and at national and regional levels.



BDV BIG DATA VALUE ASSOCIATION

IoT and Data Challenges

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Get value out of the data

Find your own business models in upcoming ecosystem

Ensure secure and reliable data access

Drive innovation projects

Use and influence global standardization

Thank you!

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