Enterprise Integration and Interoperability improving Busines Analytics Processes

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EI2N 2021

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TO **PRODUCTION**

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Agenda

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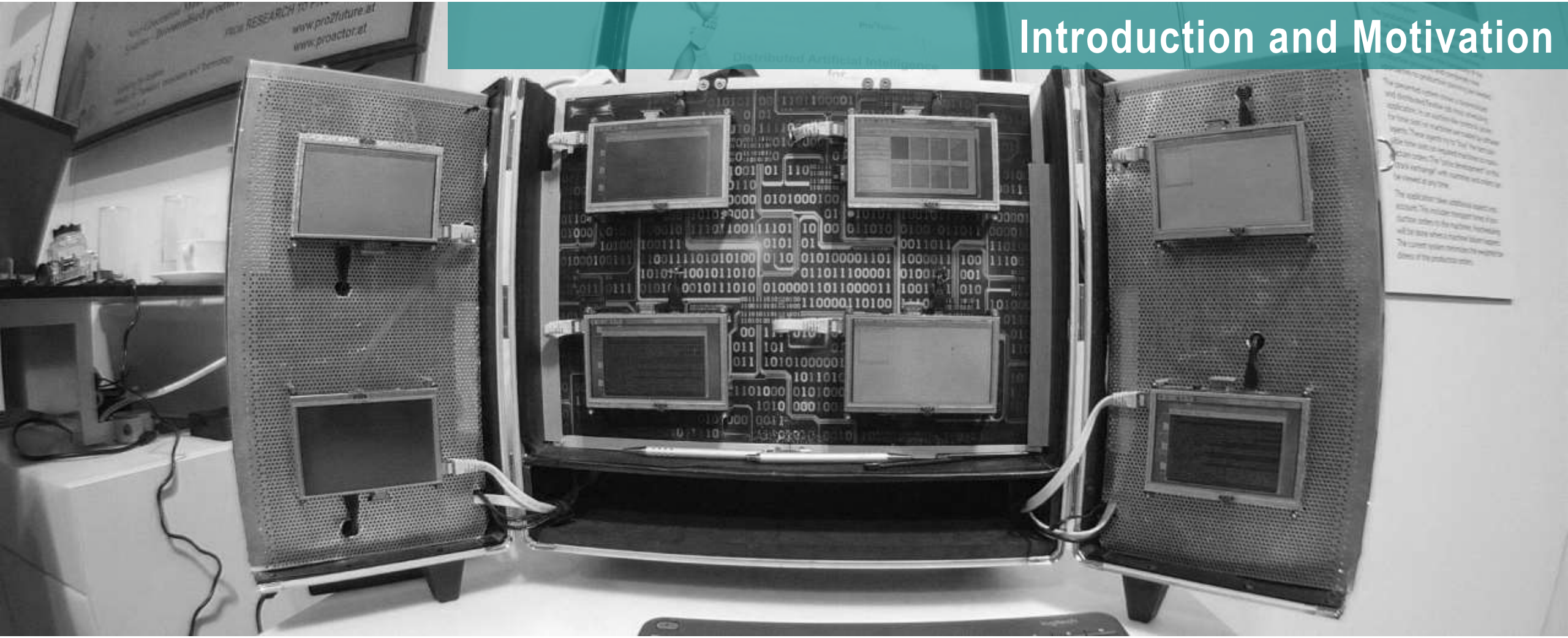
Introduction and Motivation

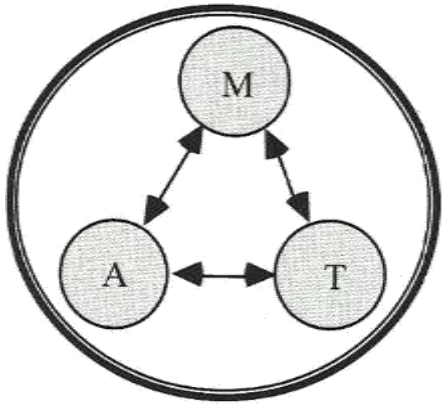


Introduction and Motivation

BA & EI2 Research Grounded in Business Informatics (de: Wirtschaftsinformatik):

IT support for users to execute their tasks in organizations better:

- better decisions
- more efficient
- more effective
- more flexible



- M [Mensch] … Human / Worker
- A [Aufgabe] … Task
- T [Technik] … (Information and Communication) Technology

BA projects are currently ineffective:

- 80% of time goes into data preparation

Significant barrier in analytics:

- high data storage and manipulation costs
- data complexity
- data access issues

Business Analytics (BA)

Business Analytics (BA)

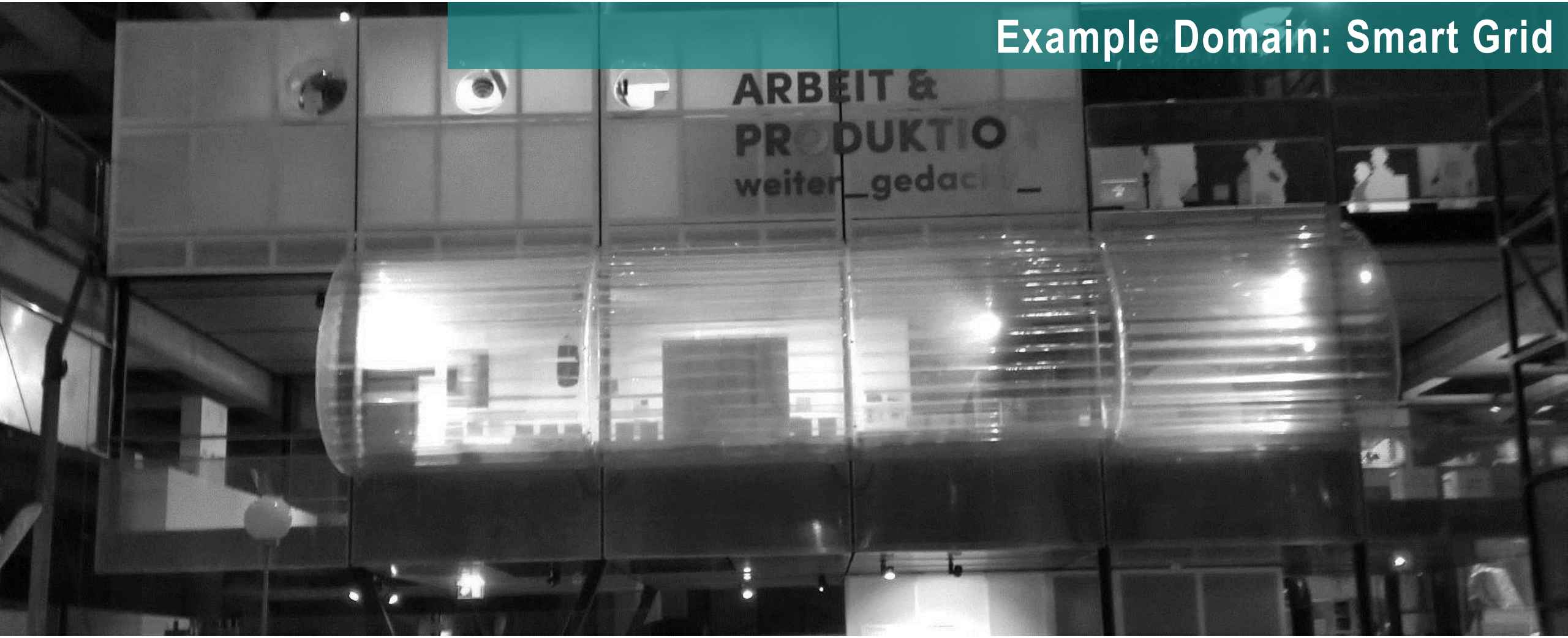
Processes and tools that allows to discover valuable information and knowledge (actionable insights) in the enterprise IT systems

- Operations Research (OR)
- Machine Learning (ML)
- Decision Making
- Big Data
- Business Intelligence

Three types of BA approaches

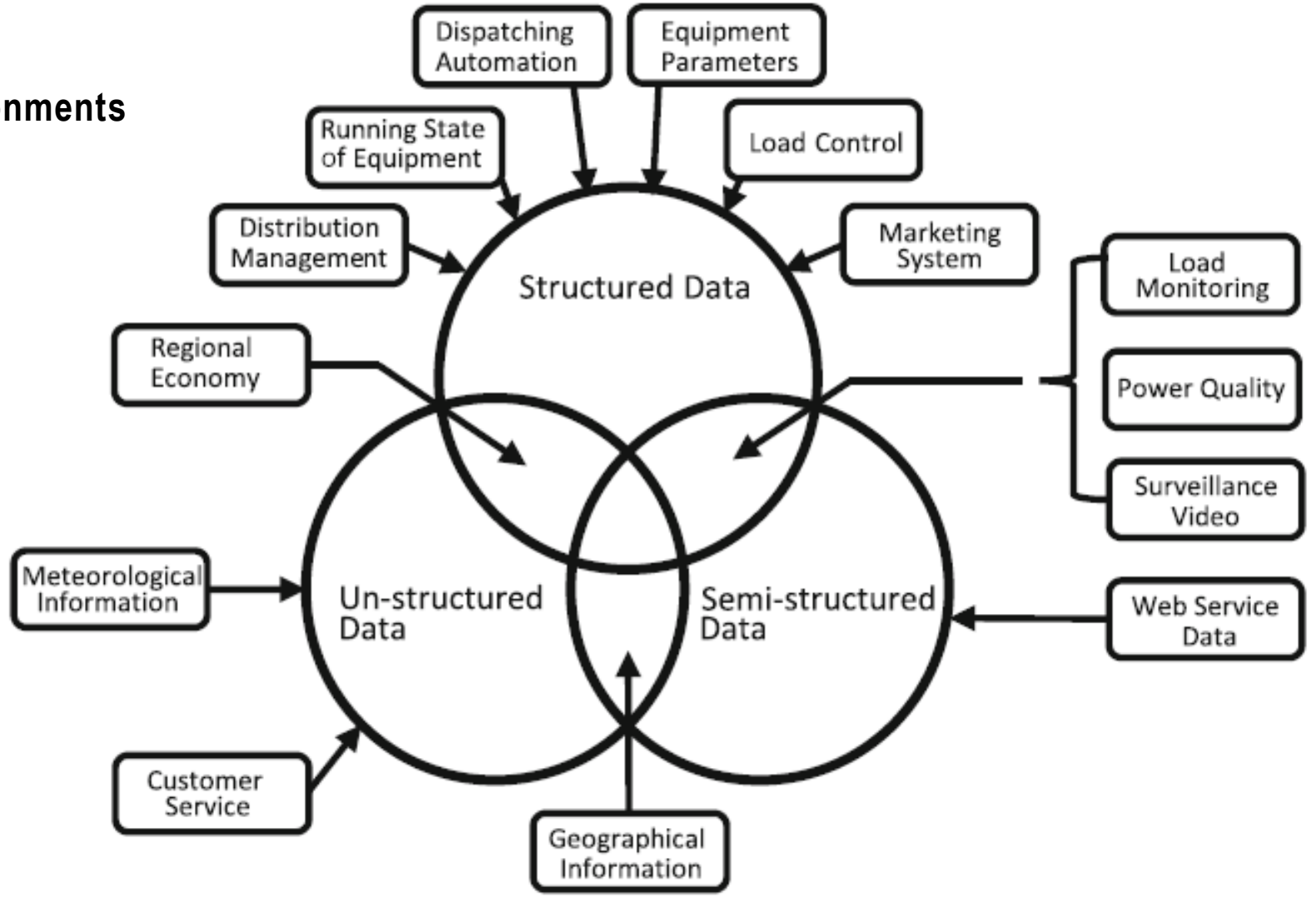
- (a) descriptive analytics -> make a situation transparent
- (b) predictive analytics -> allow a decision maker to forecast a situation (typically using statistical methods)
- (c) prescriptive analytics -> analyze multiple courses of action (operations research and quantitative models)

Example Domain: Smart Grid



Example Domain: Smart Grid

Data Sources in Smart Grid Environments



(Zhang et al., 2018).

Example Domain: Smart Grid

Descriptive Analytics

- Asset health monitoring
- Fault detection
- Power quality monitoring
- Detection of energy loss
- Visualization of outage management
- Load disaggregation for reducing energy footprint

Predictive Analytics

- Electric device state estimation / health monitoring
- Predictive maintenance
- Condition based maintenance
- Renewable energy forecasting
- Load forecasting and profiling

Prescriptive Analytics

- Integrated resource allocation
- Transient stability analysis (resilience analysis)
- Dynamic energy management
- Balance the (predicted) load with energy producers and consumers

Enterprise Integration and Interoperability (EI2)

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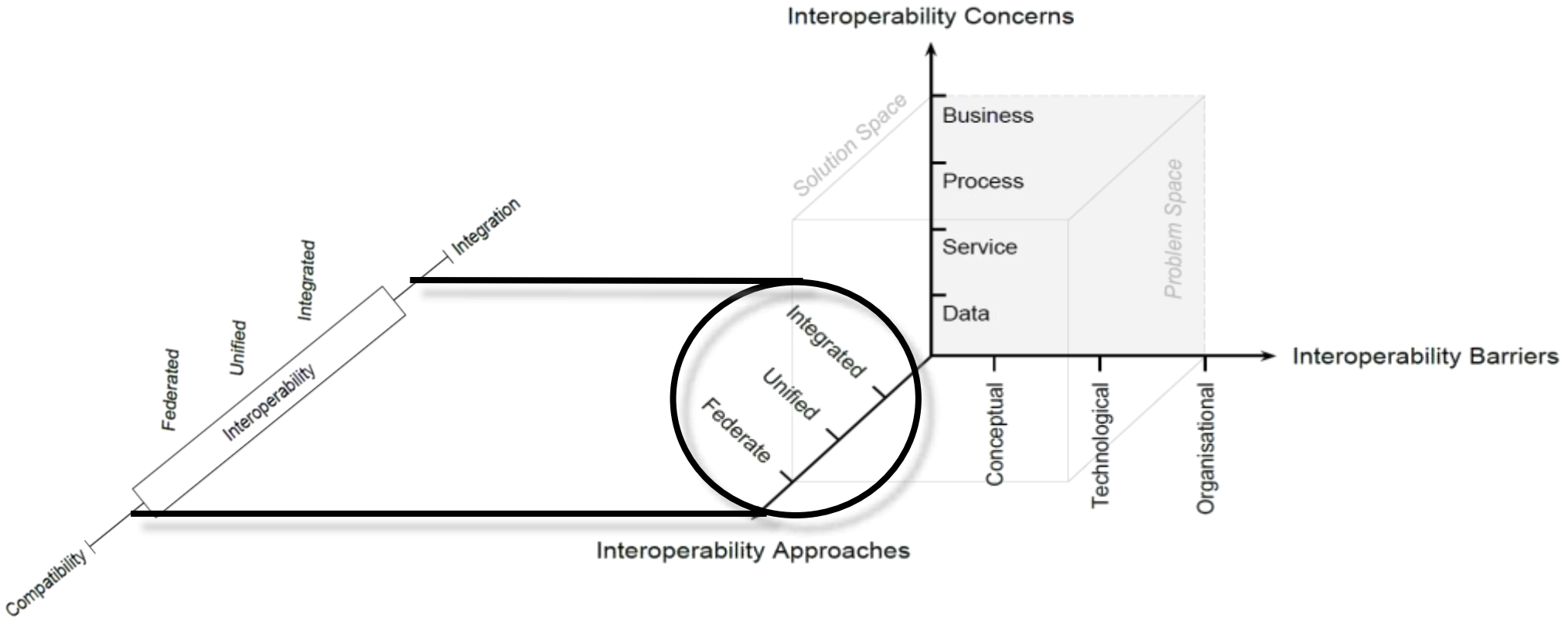

Contributions of EI2 to BA

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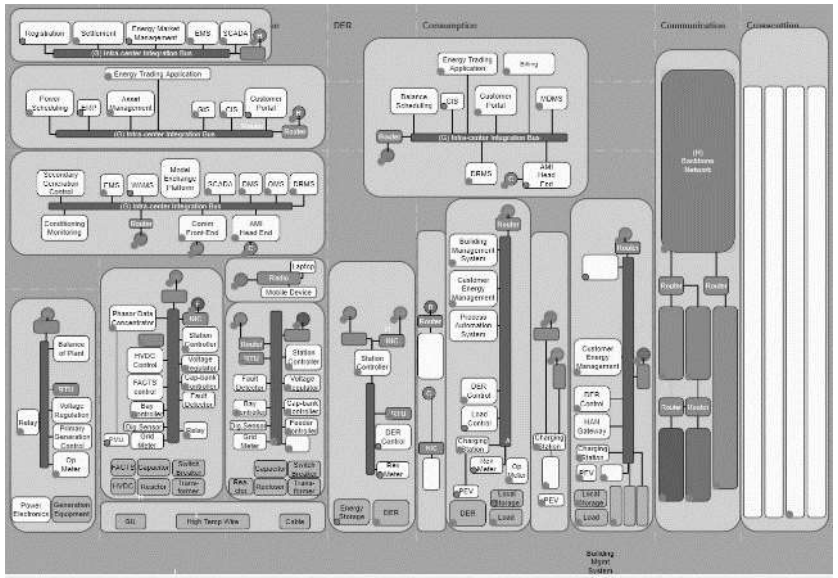
Descriptive Analytics

- automated Extraction-Transformation-Load (ETL); like in Business Intelligence
  - requires technical interoperability
  - static solutions for system-of-system, involving different data sources
- Graphical Approaches
  - Apache Nifi https://nifi.apache.org/ for modelling data flows
- Smart Grid
  - Many standards http://smartgridstandardsmap.com/



Contributions of EI2 to BA

Predictive Analytics

- statistically seen, no significant number of approaches ;-)

Contributions of EI2 to BA

Prescriptive Analytics

- S^3-Enterprise (Sensing, Smart and Sustainable) & Enterprise Operating System
  - Basis for smart decision making
  - Decentralized (& agent-based) approaches
- Modelling behavior of agents
  - OoEICAS Domain Specific Language (DSL)

Conclusions

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A new project found at the UniSA (South Australia) – after final paper

Interoperable Analytics

- Future Energy Exports Cooperative Research Centre
- liquefied natural gas & hydrogen industry
- https://www.fenex.org.au/
- Research Program 3 – Digital Technologies and Interoperability

GAIA-X as decentral data exchange infrastructure without centralized storage

Limited existing approaches

I see great potential in supporting analytics using loose coupled data sources:

- Interactive tools to discover data
- Tools for supporting dyamic extraction-transformation-loading
- Edge Computing for reducing latency

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