Stephan Kautsch, ABB Network Management Forum, October 9th 2013

Feed-in management of renewables Basis for predictive network control of distribution grids

Predictive network control
Agenda

- Background
  - Use cases for feed-in management
  - Measures to avoid bottlenecks in the grid
- Experiences gained in Smart Grids projects
  - MeRegio and RiesLing
- Predictive network control
  - Solution concept
  - Phased introduction
- Summary
- Outlook

Background
Use cases

- The Transmission System Operator (TSO) detects power surplus in his control area, not able to balance this using his possibilities.

  → Feed-in management on behalf of the TSO

- The Distribution System Operator (DSO) detects ideally some hours in advance a bottleneck in his grid, based on too high distributed generation.

  → Feed-in management on its own behalf

Background
Measures to avoid bottlenecks in the grid

- Grid related measures (Smart Grids)
  - Voltage regulation
  - Shifting normal open points
- Reduction of feed-in of distributed generation
- Market related measures (Smart Markets)
  - Demand Side Management (DSM)
  - Grid capacity management

MeRegio - Minimum emission region
Optimal local generation and consumption

Figure: In Freiamt exist 13.200 kW of renewable energy resources, generating 160% more than the required electricity

Objectives

- Create a market place connecting 1,000 private and commercial energy customers with centralized and decentralized energy providers
- Minimize overall CO_2 emissions in a region

Customers & partners

- EnBW, IBM, SAP, Systemplan, KIT

ABB's response – Smart grid scope

- Installation and operation of remote control and measurement equipment in secondary substations
- Enhanced SCADA system utilizing load and generation forecasts for predictive bottleneck and future voltage level calculations

Benefits

- Controllable local generation and consumption to allow highly efficient use of existing infrastructure and least effort for grid extensions

Supported by:
Federal Ministry of Economics and Technology
on the basis of a decision by the German Bundestag

Smart Grids project: RiesLing
Modular, intelligent secondary substation automation

Figure: Smart secondary substation in Wechingen

Objectives

- Development and implementation of monitoring and automation equipment in secondary substations for safe, reliable and economical operation of distribution grids

Customers & partners

- EnBW ODR, EnBW REG, T-Systems

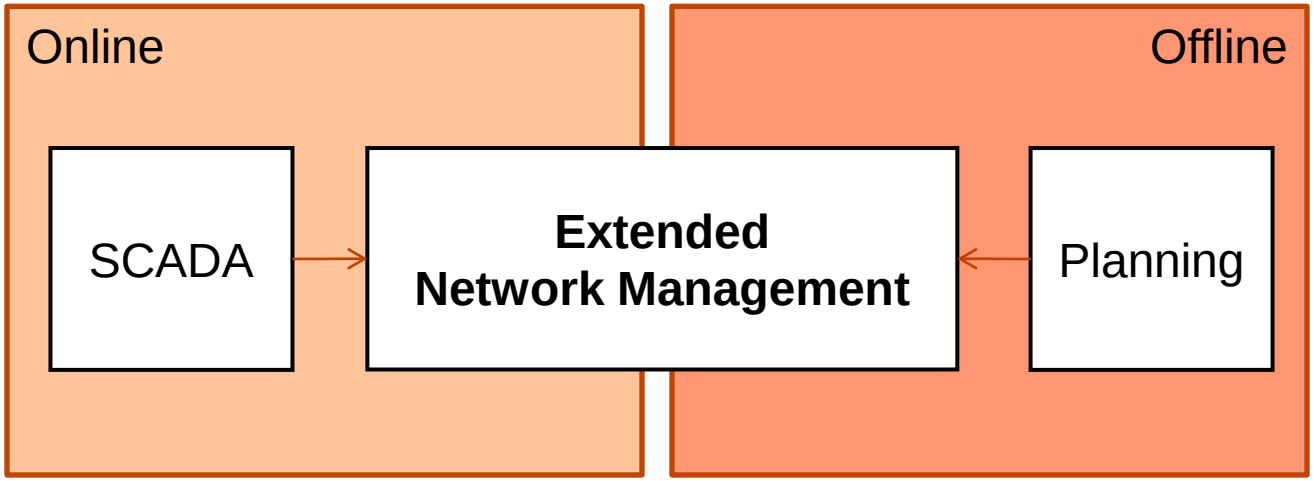
ABB's response – Smart grid scope

- ABB remote control and measuring equipment for power monitoring, voltage control and fault detection
- Predictive network control
- Secure, managed communication between station and control room based on Deutsche Telekom technology

Benefits

- Modular, scalable solutions for secure, economical and predictive distribution grid operation

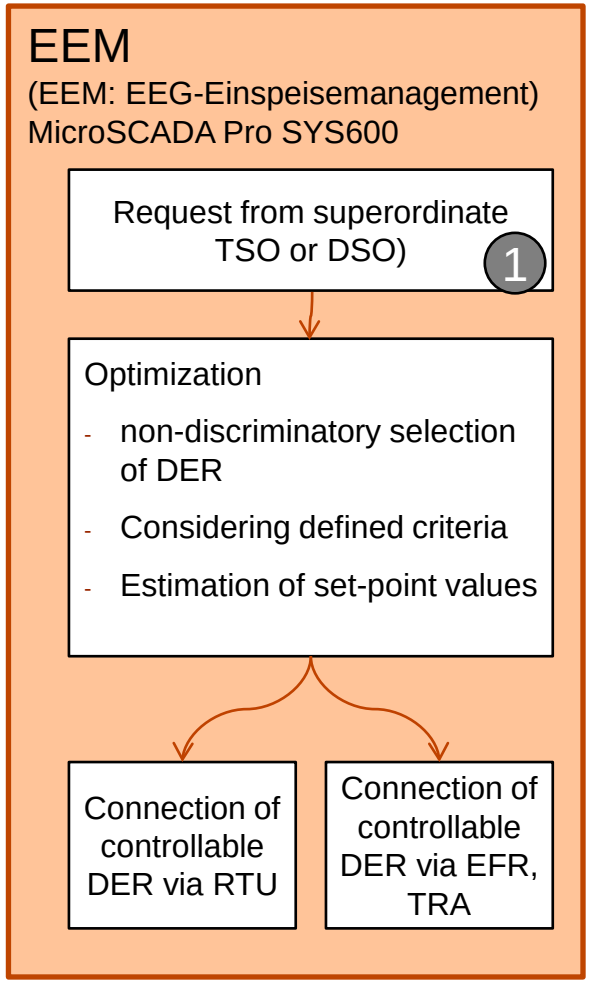
Predictive network control
Positioning



- Predictive network control as link between
  - Online network control
  - Long term grid expansion planning

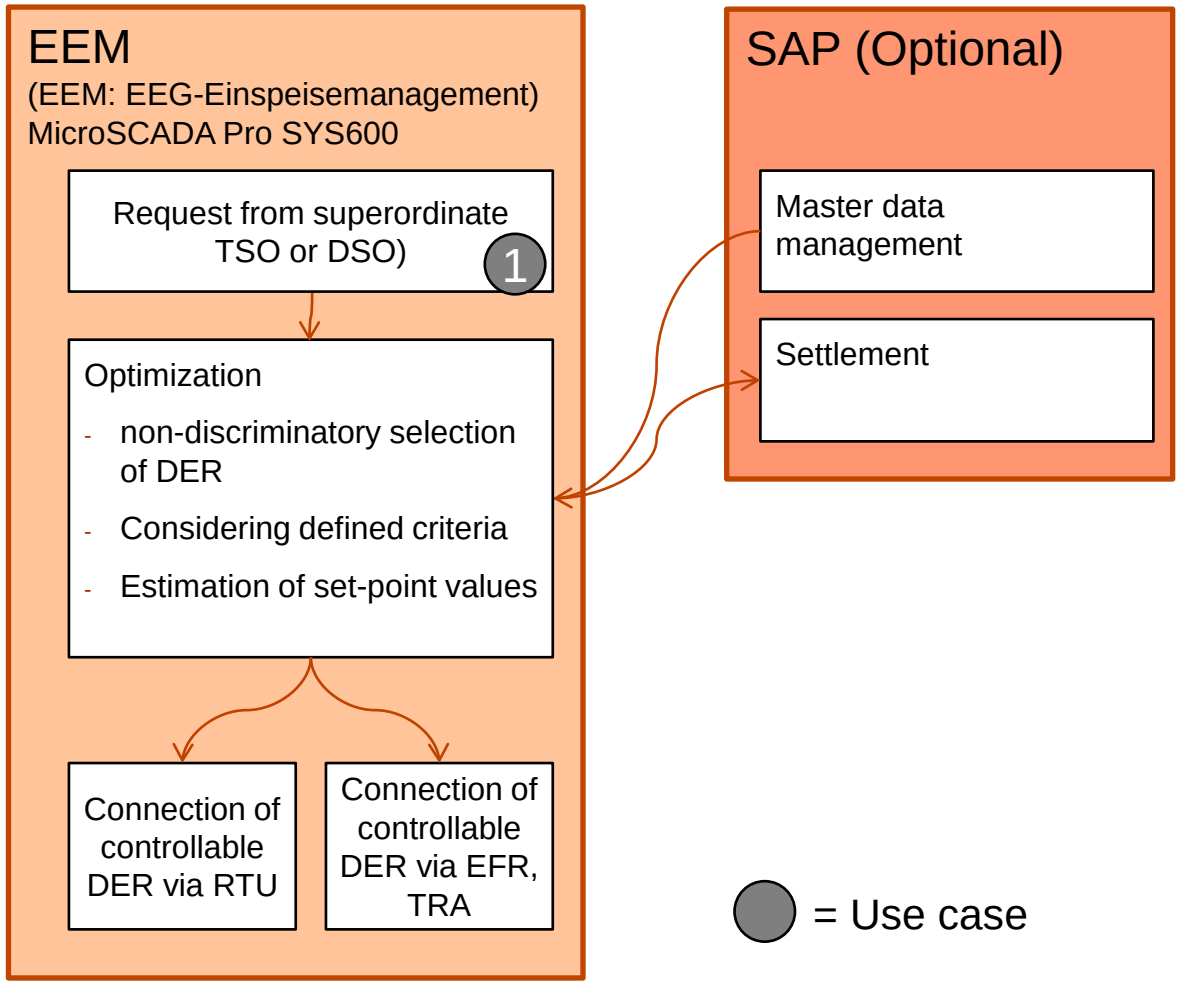
Predictive network control
Phase 1: Introduction of feed-in management

- DER
  Distributed
  Energy
  Resource
- TSO
  Transmission
  System
  Operator
- DSO
  Distribution
  System
  Operator
- EFR
  Europäische
  Funkrund-
  steuerung
  (Radio
  control)
- TRA
  Tonfrequenz
  Rundsteuer
  Anlage
  (Ribble
  control)

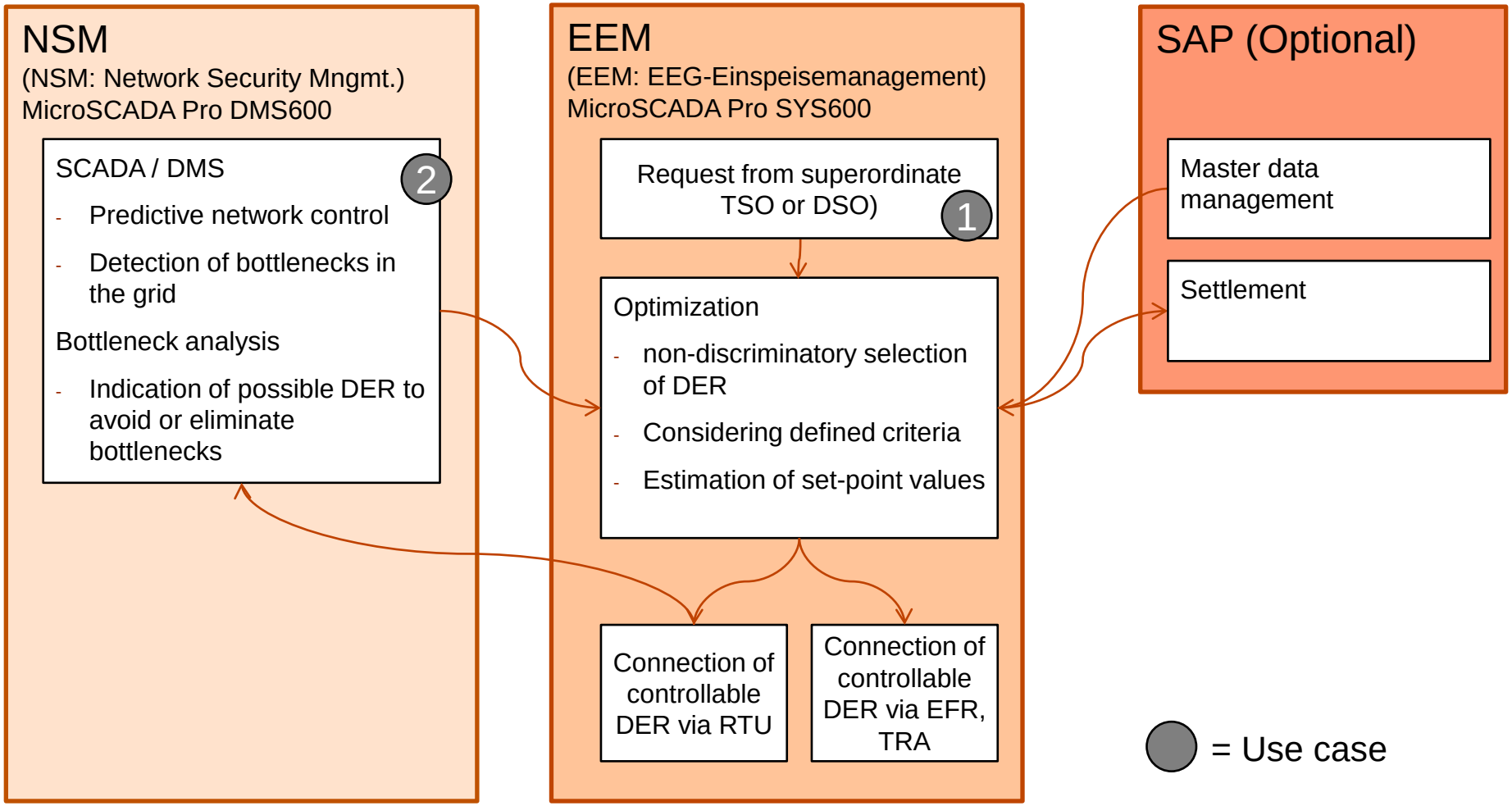


= Use case

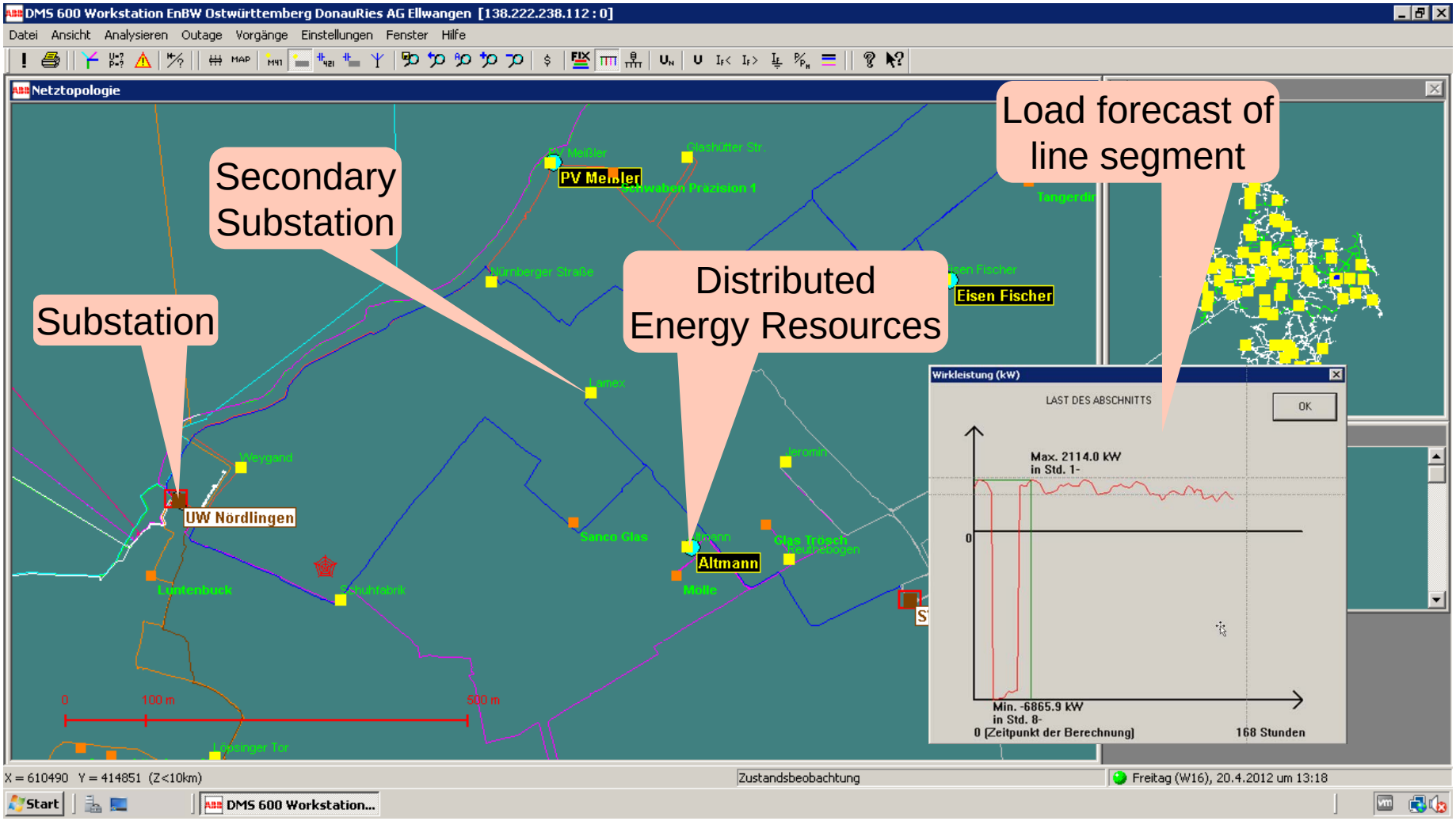
Predictive network control
Phase 2: Integration with SAP for settlement



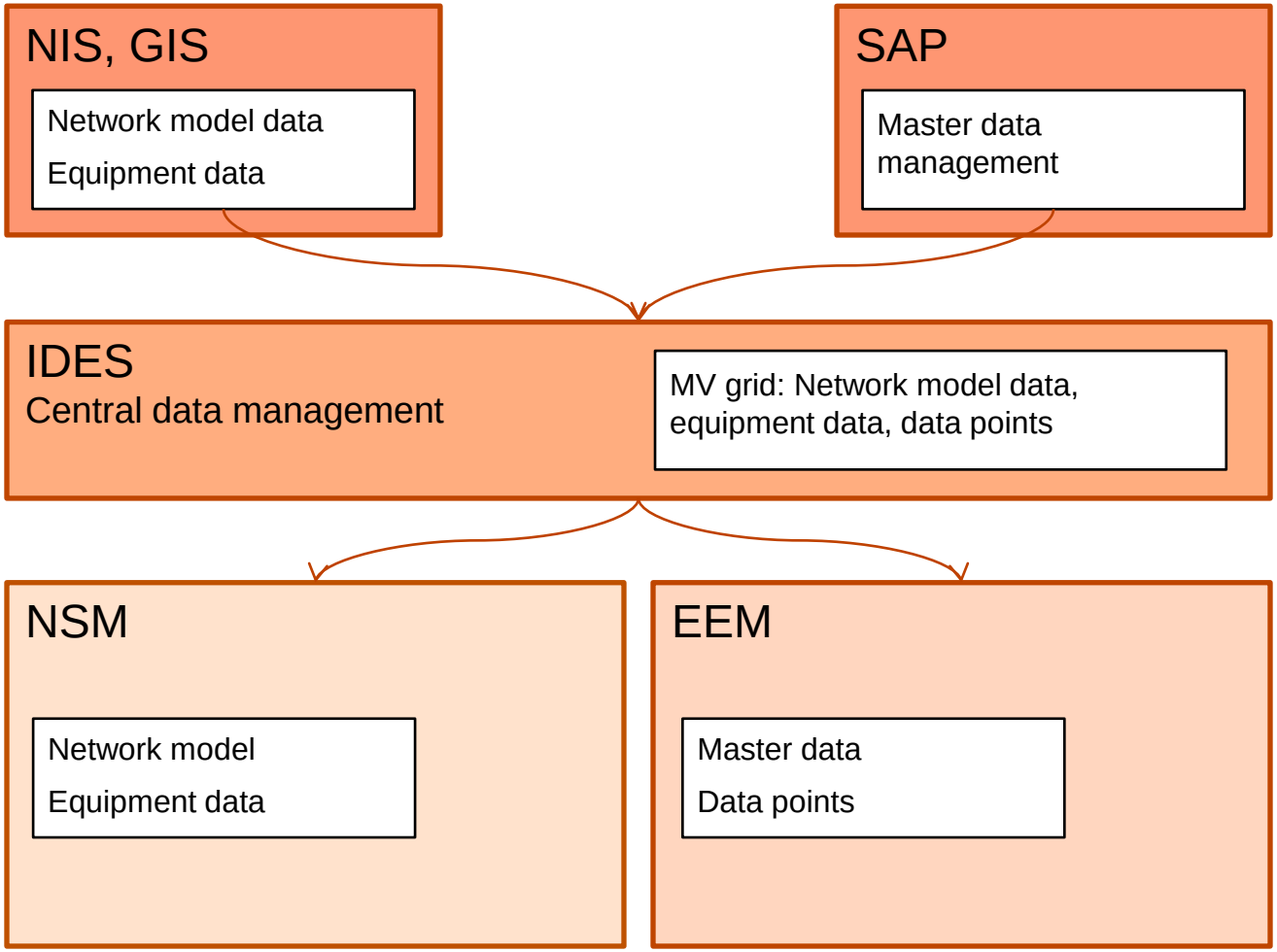
Predictive network control
Phase 3: Introduction of Network Security Management



Predictive network control
Phase 3: Introduction of Network Security Management



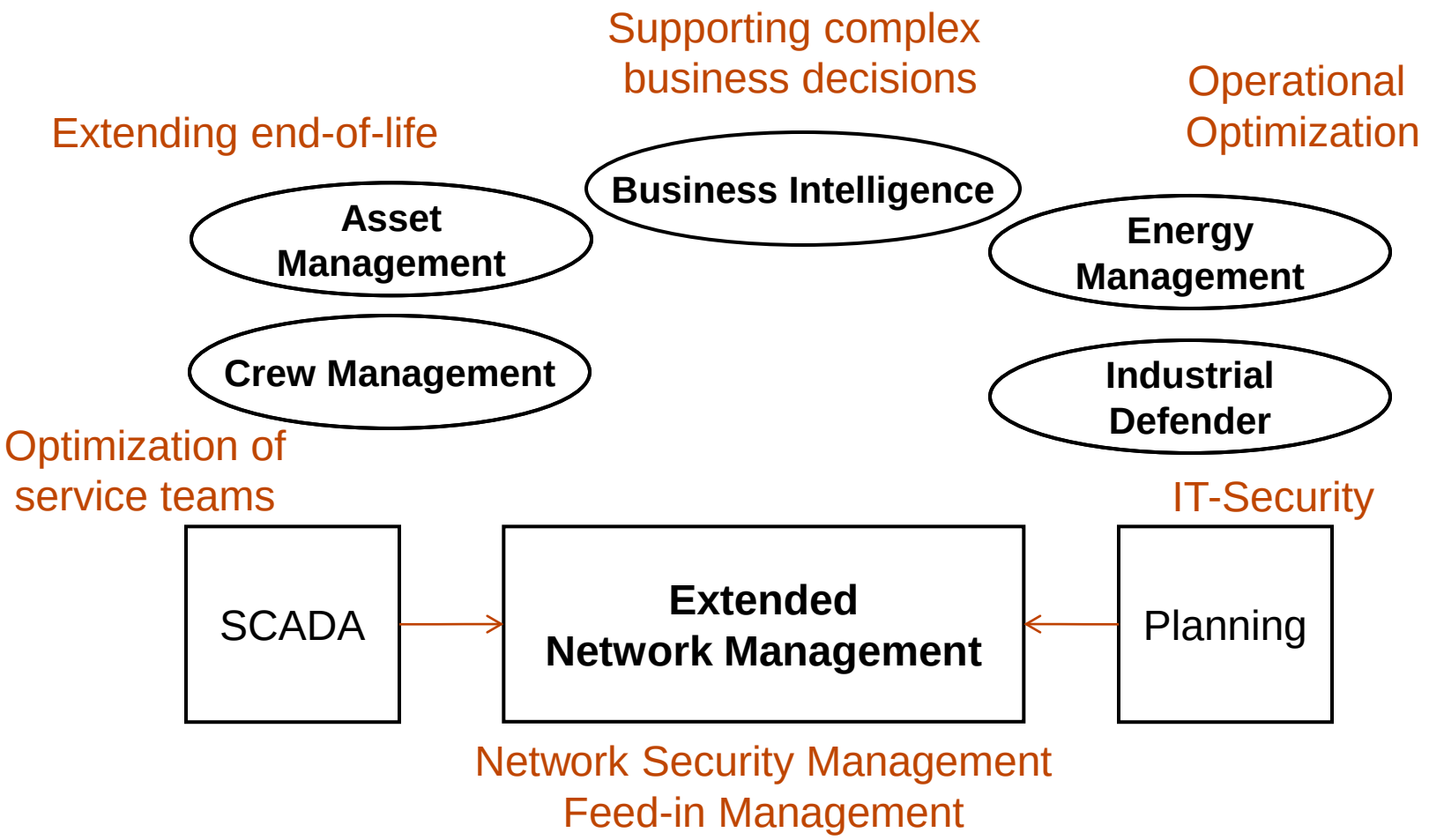
Network Security Management
Data management



Summary

- Phased introduction depending on implementation of use cases
- Predictive network control to detect bottlenecks in the grid in an early stage
  - Sufficient time to use grid related measures
  - Pre-announcement >24h of feed-in power reduction measures
  - Expandable for market related measures like DSM

Outlook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