



Hochschule für Angewandte
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A Distributed Registry for Service-based Energy Management Systems

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2. D-A-CH Energieinformatik Konferenz
Wien, Österreich

Agenda

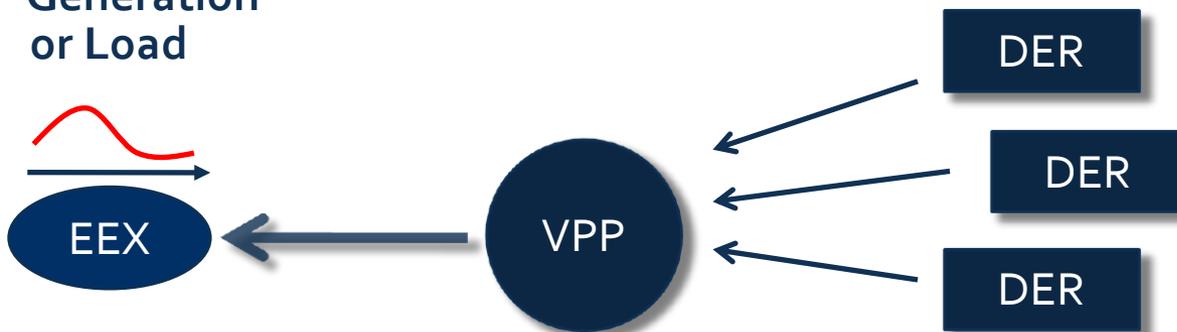
- + Problem Statement
 - + Aggregation of DER
 - + The Aggregators Need
- + Distributed Registry
 - + Supporting DER Search for Aggregation
 - + Technical Requirements
 - + Architectural Concepts
- + Conclusions
 - + Business Cases
 - + Further Research



Problem Statement: Aggregation of DER

- + More and more Distributed Energy Resources (DER) become part of the grid
- + DERs are highly heterogeneous
 - + Different conditions (wind, sunshine, etc.)
 - + Scale (from solar cells on a rooftop up to MW-wind turbines)
- + Most DERs cannot participate on exchange markets directly

Generation
or Load

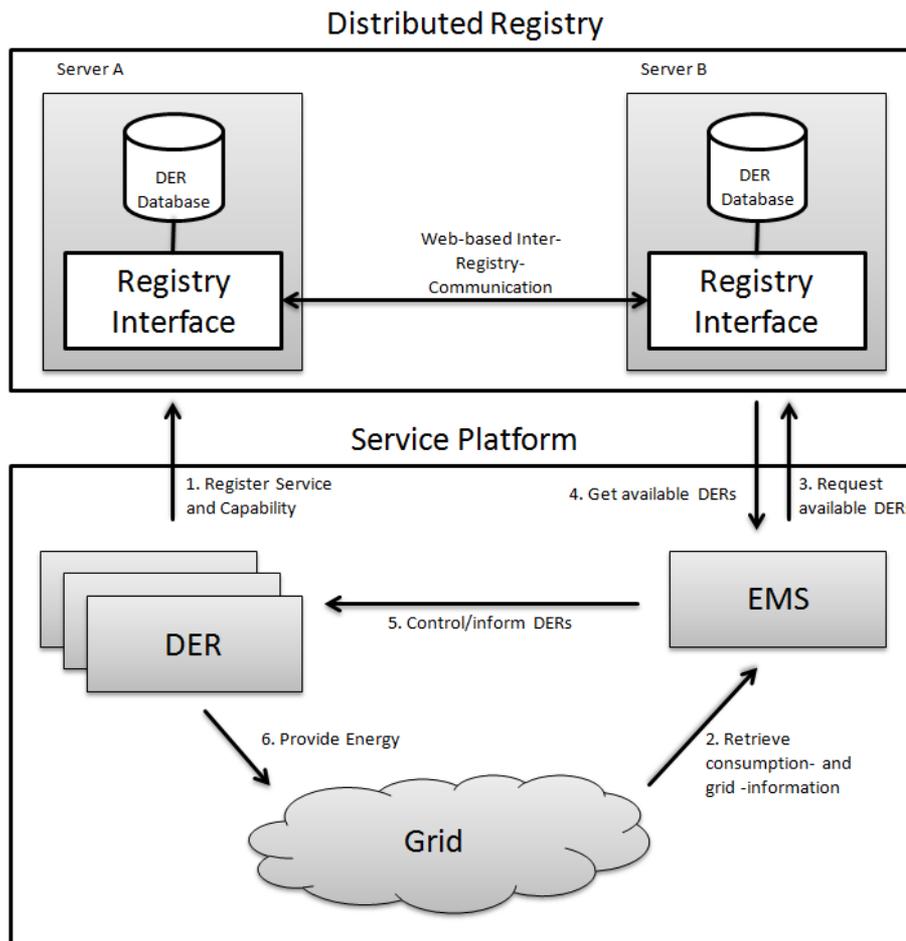


Problem Statement: The Aggregators Need

- + Aggregation of DERs as Virtual Power Plants (VPP)
 - + Enables organized market participation of small- and medium-scale producers.
- + To organize DERs as VPPs System Operators will need Energy Management Systems (EMS) as middleware
 - + In this scope we call the VPP managing and aggregation platform in the Market Domain *[NIST-Framework]* **EMS**
- + DERs may register at a **registry** where a system operator can search for an appropriate amount of generation capability and control-capabilities to compensate demand-side fluctuations



Distributed Registry: Supporting DER Search for Aggregation



- + DERs **register** their service at the Registry
- + The Operator plans the needed VPP structure
- + **Searches** the Registry for appropriate DERs

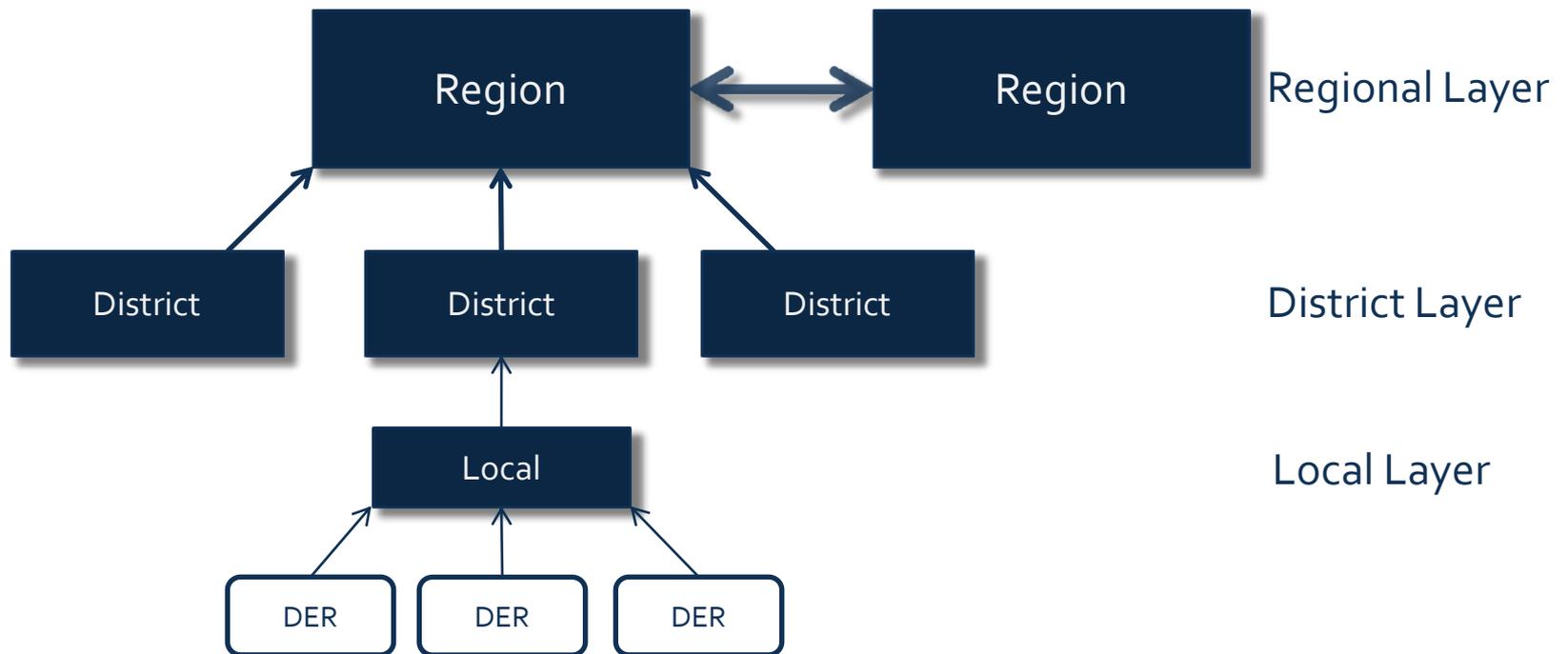
Distributed Registry: Technical Requirements

- + Highly automated and fast process
- + Role- and security-system for access-rights
- + Should support and interact with diverse EMS through a generic interface
- + System resilience against failures and losses as well as storing many datasets

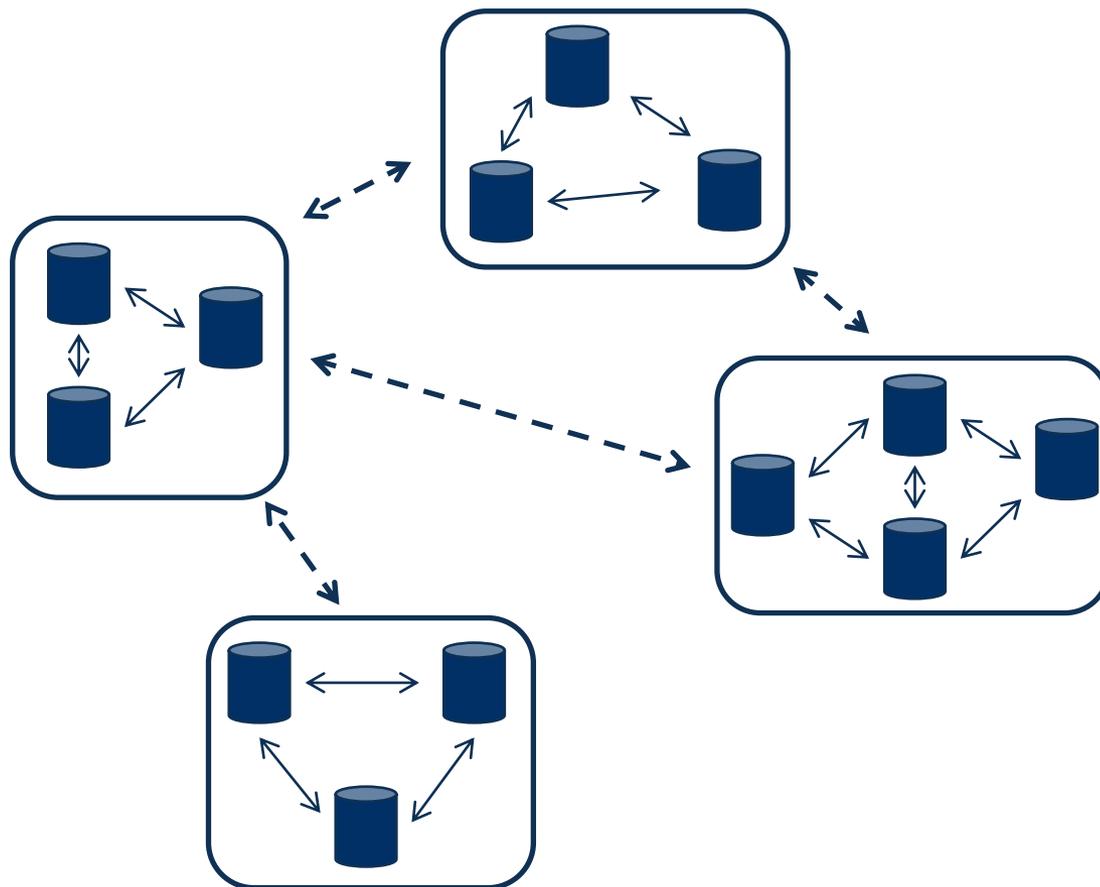
**These requirements can only be achieved
through a loosely coupled distributed registry!**



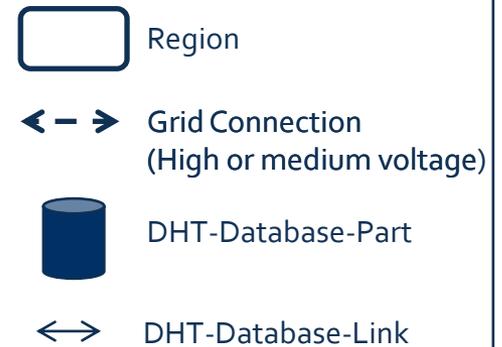
Distributed Registry: Architectural Concept I



Distributed Registry: Architectural Concept II



Legend



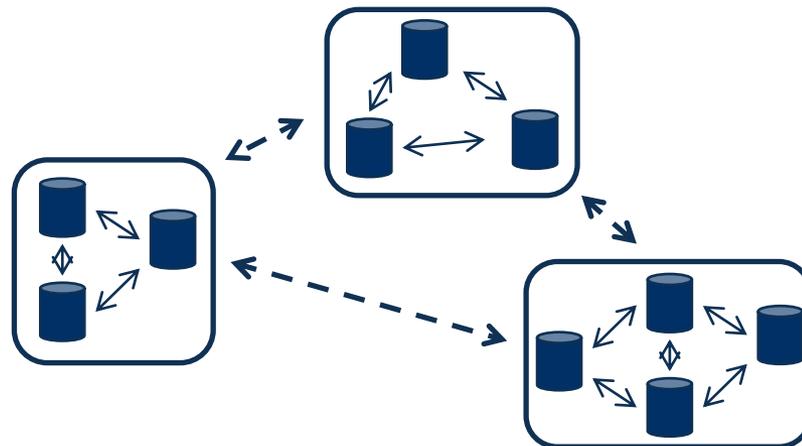
Conclusions: Business Cases

- + The distributed registry serves as a yellow pages service for DERs
 - + Allows dynamic publishing and searching DERs
- + Location-based coordinated Demand Response
 - + Optimizing the utilization of the grid by reducing transport losses
 - + Obeying DSO operation conditions
- + Primary sector
 - + Grid operators can use the DERs as additional control capabilities for voltage regulation



Conclusions: Further research

- + Evaluation of the proposed Registry Distribution Concepts
 - + Technical Analysis of the Operation Requirements
- + Interfaces between EMS and registry
 - + Complete Support of Business Models
- + Semantics and Standardization of the Protocols





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Thank you for your attention!

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