SINTEG
SCHAUFENSTER INTELLIGENTE ENERGIE

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C sells

FfE

Method for determining the Feasibility of Grid and Ancillary Services by Smart Meters

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Forschungsstelle für Energiewirtschaft (FfE)

Development

- FfE e.V. founded in 1949
- Based in Munich
- Since 2001 Subsidiary FfE GmbH

Key facts

- Further education of employees and thesis students
- About 30 research projects per year
- Approx. 3 PhDs per year

Research areas

- Storage and grids
- Electromobility
- Energy markets
- Energy efficiency

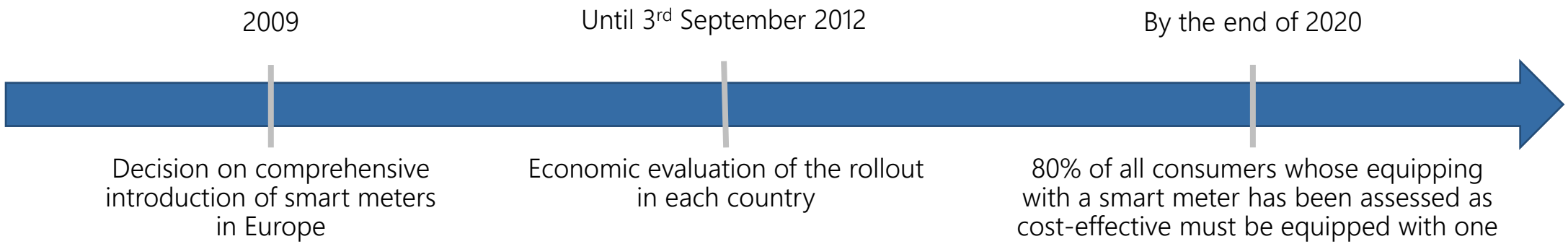
Methods

- Energy system analyses and simulations
- Data mining
- GIS models
- Industry audits

C/sells – showcases for smart network solutions

- Part of **SINTEG funding programme** (BMWi-supported)
- Duration **01.01.2017 - 31.12.2020**
- Demonstration area covering **Baden-Württemberg, Bavaria and Hesse**
- **56 partners** from science, business & industry
- **34 technical demonstrators**
- **9 participation cells**

Smart Meter Rollout in Europe



- Recommendations on common minimum requirements that smart meters in the EU should fulfil
- Specific implementation is up to the individual countries

Source: Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009, Brussels 2009.

Functions as well as the procedure and level of the rollout vary over Europe

Smart Meter Rollout in Europe – Services in Specific Countries for Now and the Near Future

Services	Germany	Sweden	Italy
Historical Consumption to compare weekly/monthly/… consumption	x	x	x
Dynamic Tariffs	x	x	x
Real-Time Consumption Data (in € or equiv.)	x	x	x
Flexibility Provisions (for explicit demand response)	x	x	x
Unusual usage alert (during a long time period)	x	x	x
Comparison of energy consumption with similar peers	x	x	-
Integration of Prosumers in the Market	x	-	x
Ease smart charging of electric vehicles at home	x	-	x
Pre-payement (pay-as-you-go) system	x	-	x
Bill forecasting (through historic smart meter data)	x	-	-
Energy sharing in local energy communities	x	-	-
Real-time carbon impact (in tCO2 equivalent)	x	-	-
Fuel poverty detection (through data analytics)	-	-	-

Source: Tounquet, Frédéric et al.: Benchmarking smart metering deployment in the EU-28 - Final report - Study. Brussels: European Commission, 2020.

Which functionalities are most important in the individual countries?

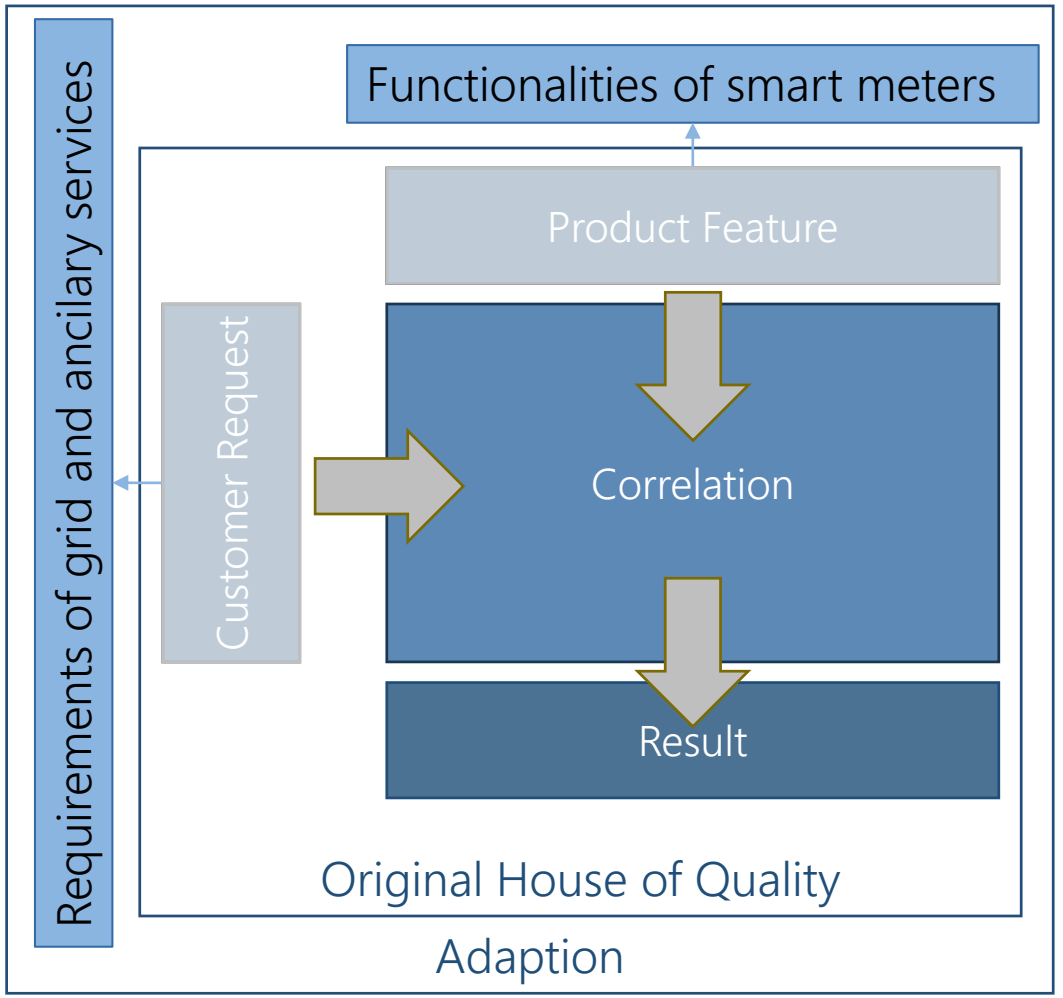
House of Quality

Goal

- Evaluate significance of functionalities for the provision of specific services.
- Determine whether smart meters fulfil requirements of system and ancillary services

House of Quality

- Method originates from Quality Function Deployment (Japan, 1969)
- Various applications as product development, quality management etc.



2 Key Findings: Significance of Functionalities & Fulfillment of Requirements

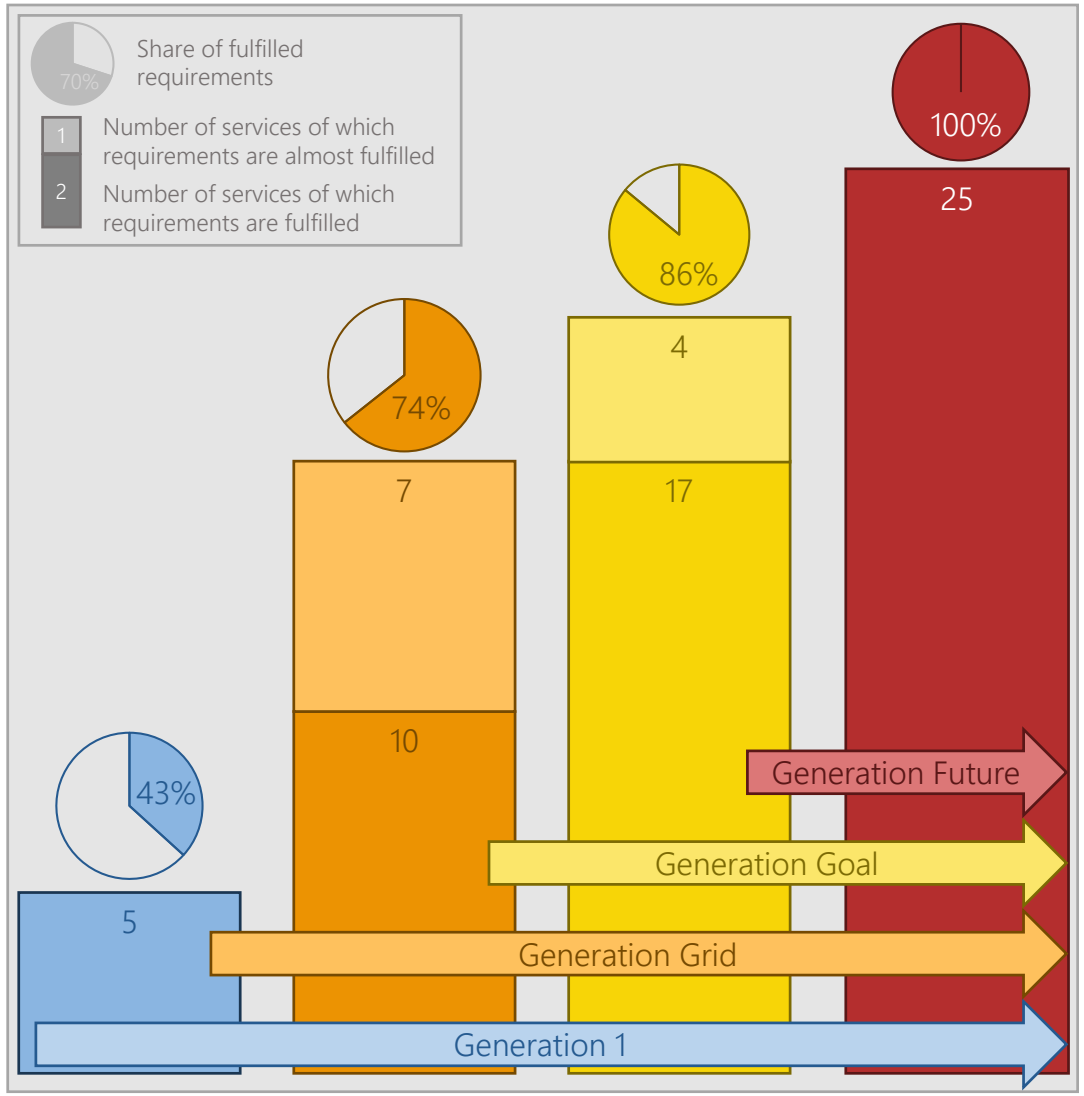
Applying the HoQ to Germany

Requirement No.	Service	Requirement	Significance of Requirement B_i	Signature Formation	Active Energy Measurement		Frequency Measurement		Fulfilment of Requirements			
				Timestamp as second index	Counter, reading in direction +A and -A	15-Minute counter course	Resolution: 0,1 Hz	Measurement Accuracy 0,1%	Generation 1	Generation 2	Generation 3	Generation 4
6	Primary control (1)	Frequency , max. deviation 10mHz (2)	1	1	0	0	9	9	0	3	3	5
28	Primary control, secondary control, tertiary control, detachable loads	Timestamp for measured values	4	9	1	3	0	0	5	5	5	5
...	...	...	...	...	...	...	...	...	...	...	...	...
	Fulfilment								10	13	13	15

5 – requirement perfectly fulfilled
3 – requirement partly fulfilled
0 – requirement not fulfilled

Statement on possible Services with different Smart Meter Devices

Possible Services Enabled by Smart Meters in Germany



- First Generation is currently rolled out: enables some basic services
- *"Generation Grid"* shall be implemented in the near future: 10 – 17 services
- *"Generation Goal"* contains all functions required by German law and fulfils 86% of the requirements of the considered services
- "Generation Future" contains all required functionalities: additionally required functions would enable 4 – 8 further services

Summary and Outlook

Smart Meter Rollout in Europe varies between the member states regarding…

- status of rollout,
- implemented functionalities,
- available and planned services.

The House of Quality…

- offers a method to evaluate the significance of functions for the provision of specific services.
- allows the determination of services that smart meters enable to be provided by equipped units.
- Enables the comparison of smart meters and their functional scope in different countries.

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