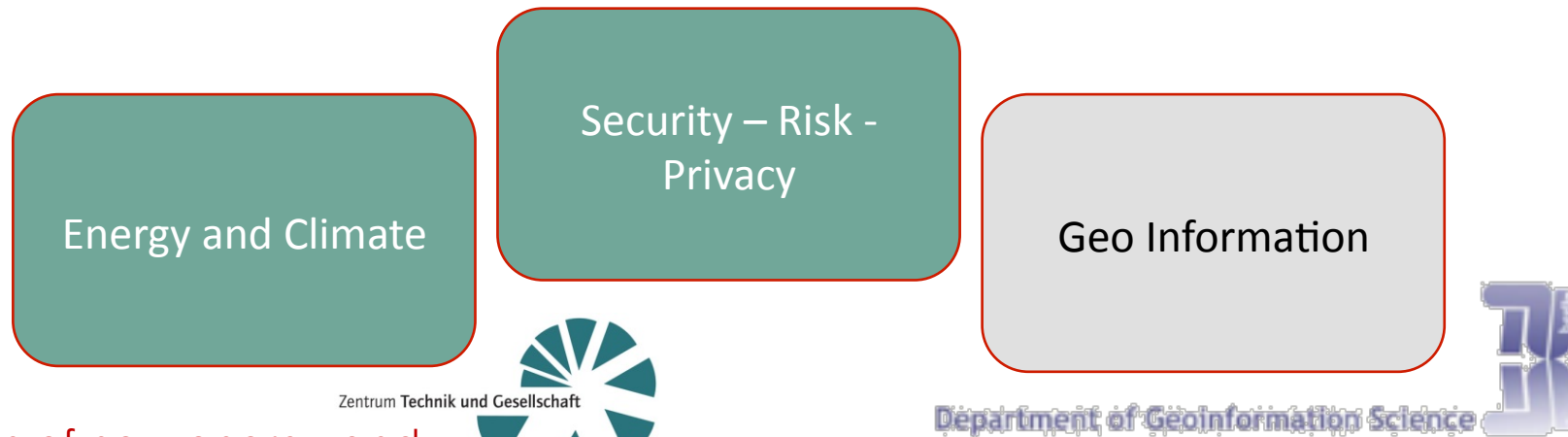


Energy Governance and Security

Trieste, 17. 12.2013

Dr. Leon Hempel
Human Technology Lab
Zentrum Technik und Gesellschaft der TU Berlin

Who we are...



Implementation of new energy and energy efficiency technologies

factors of acceptance

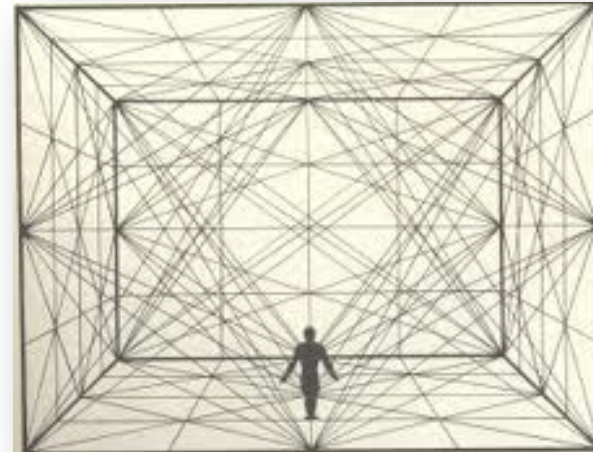
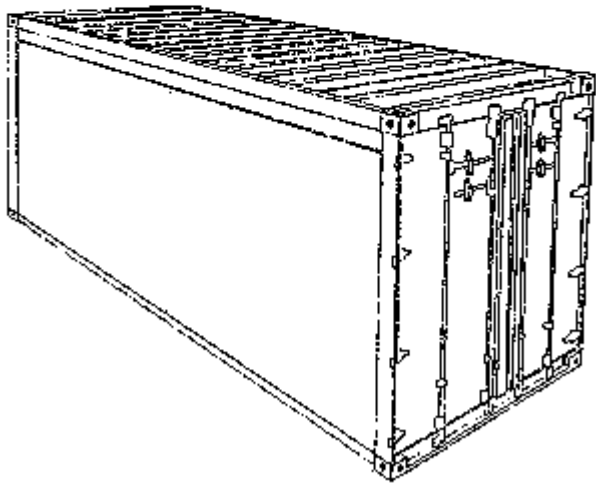
Stakeholder involvement and participation

development and evaluation of strategies, methods and instruments

Sustainable design of energy systems

requirement analysis





What we do ... System analyses and the city system model

“**Cities** (as well as regions) can be seen as a **system of systems**”

(Lane and Bohn, 2013)

City System Modelling; Interacting, interrelated and interdependent components form a complex and unified whole of buildings, streets, public bodies, utilities, people, ... & environments

Strategic level

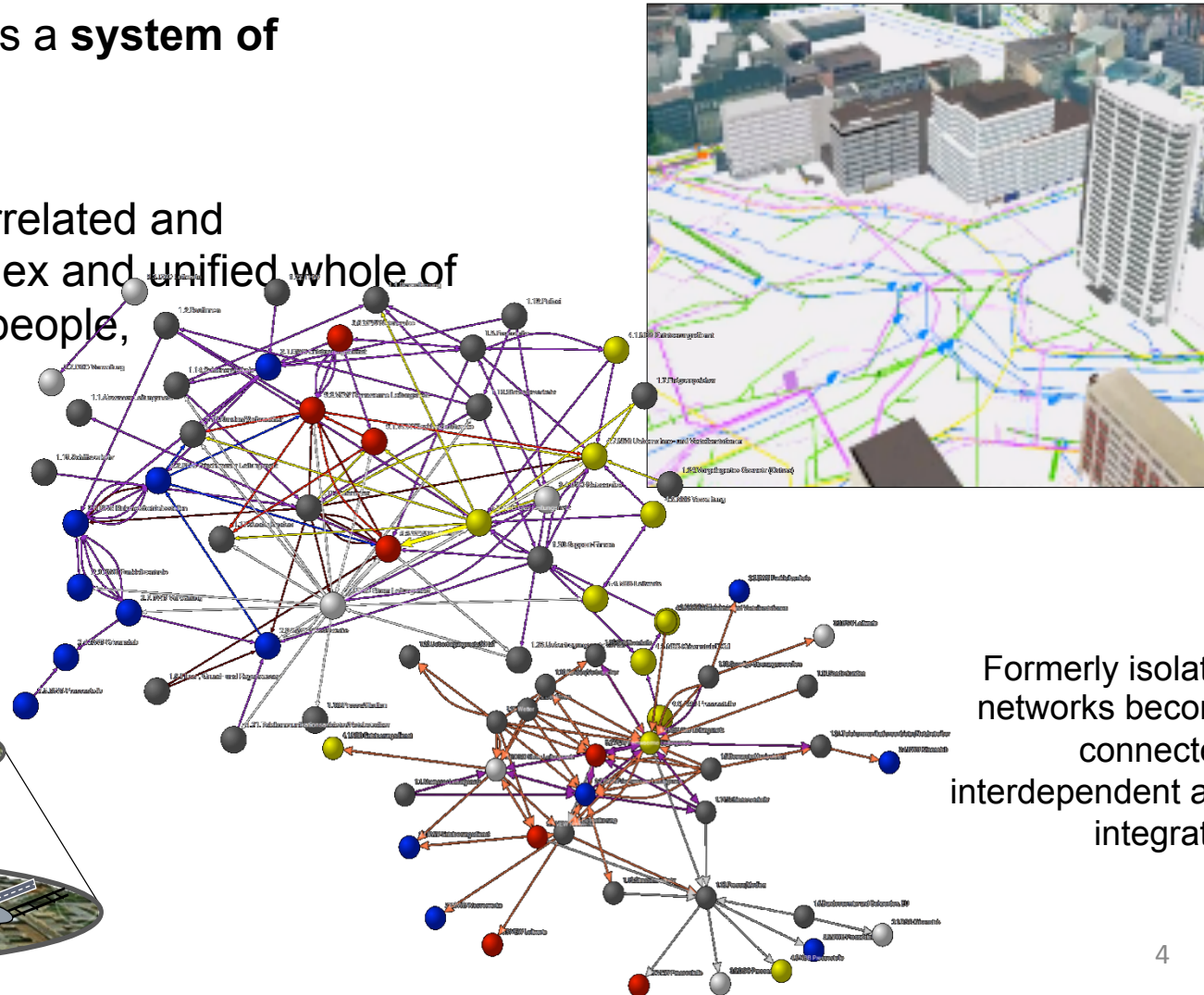
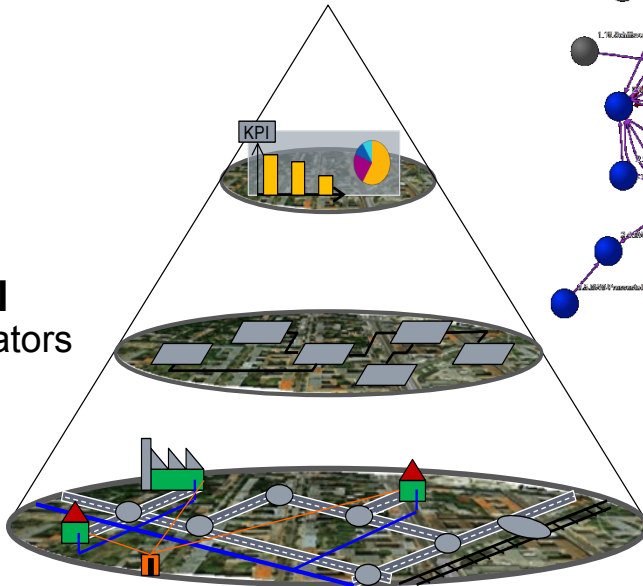
- City governance
- City administration
- Regional planning

Operational level

- Infrastructure operators
- City stakeholders

Individual level

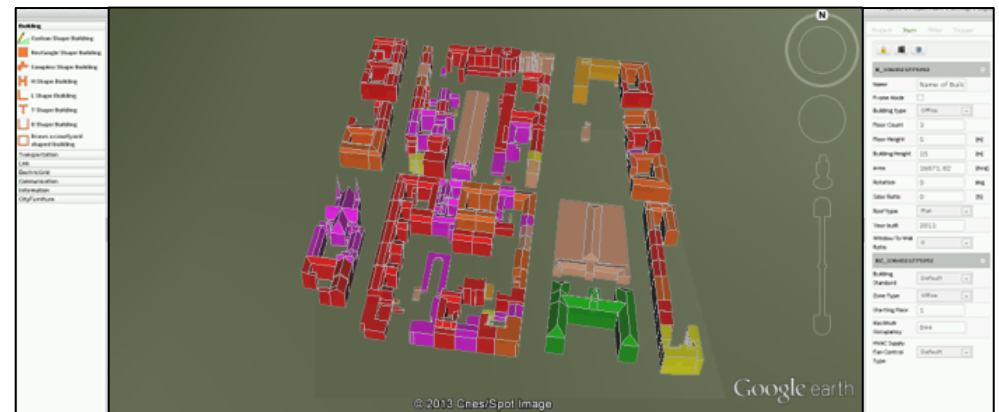
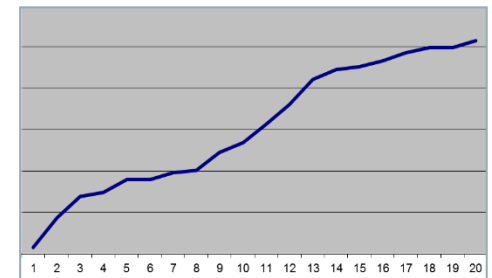
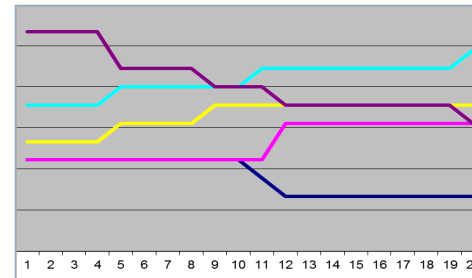
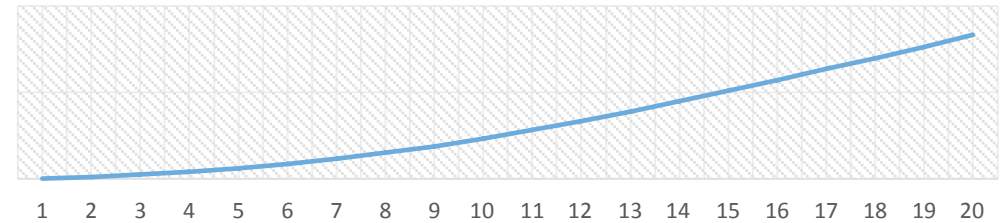
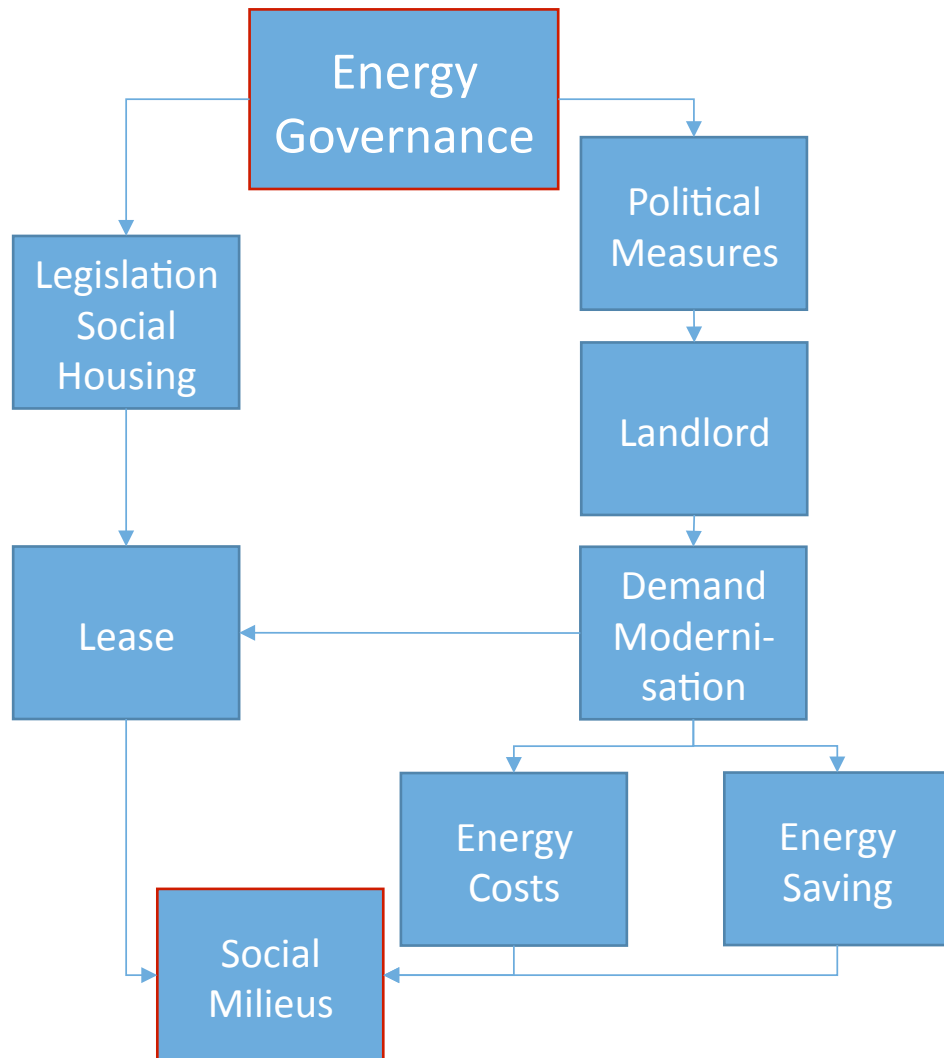
- Monitoring
- Citizens
- Public Involvement



Formerly isolated
networks become
connected
interdependent and
integrated

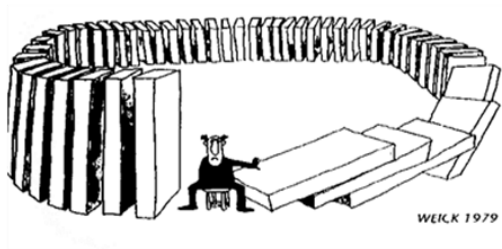
What we do: ...

e.g. Dash Board Energy Planning Simulation

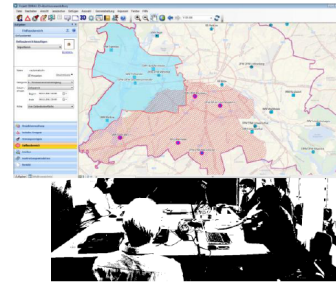


SIEMENS

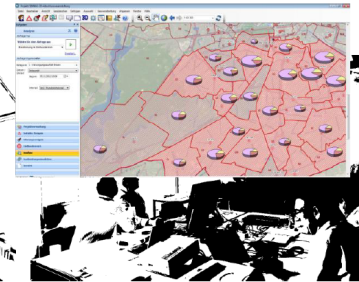
What we do ... Risk and Crisis Communication



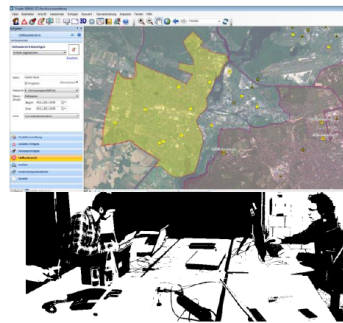
Betreiber 1



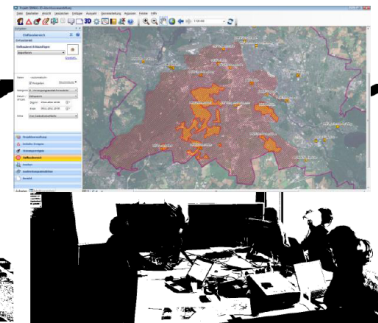
Betreiber 2



Betreiber 3



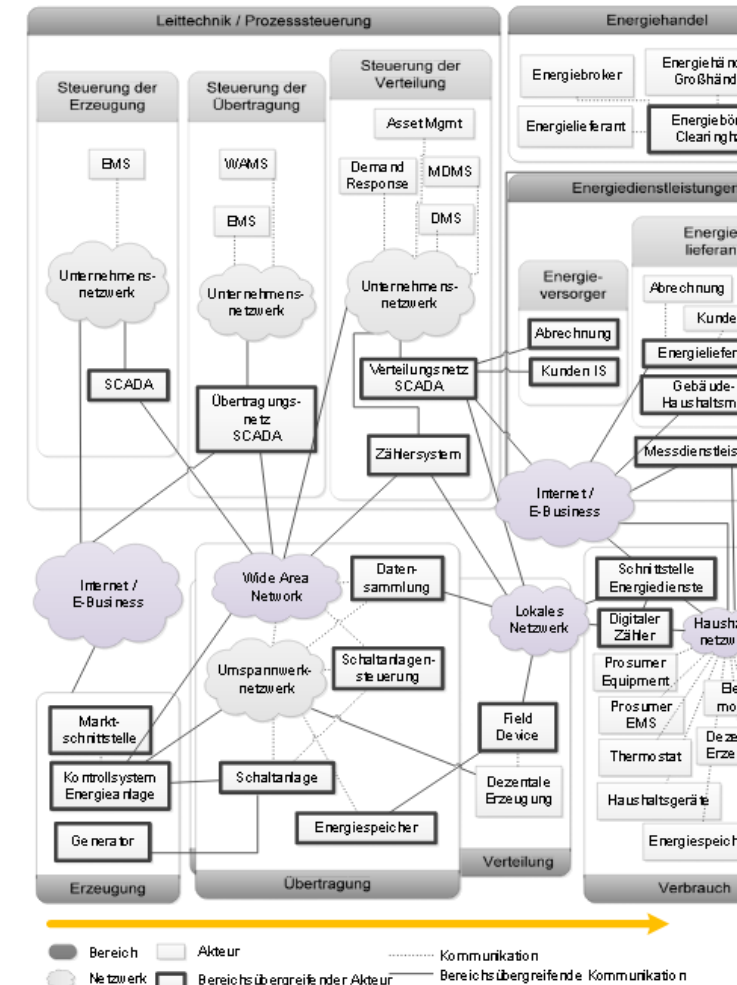
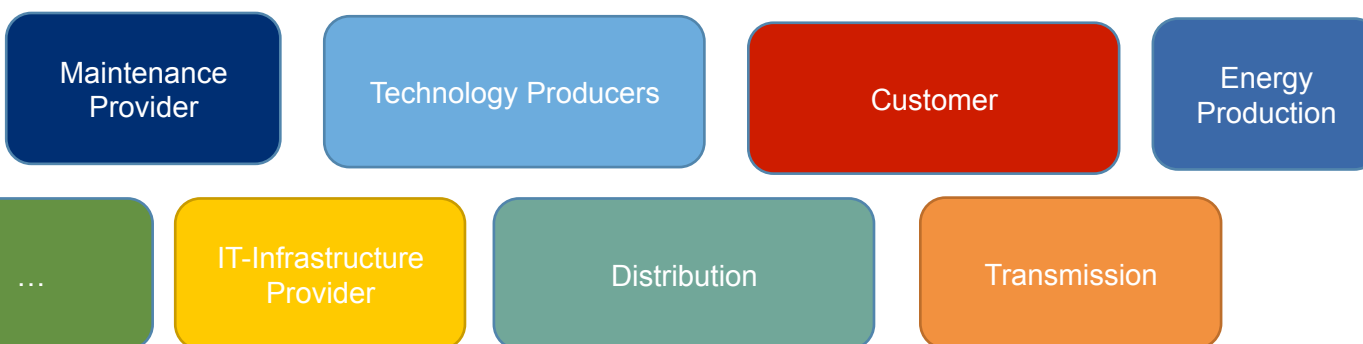
Betreiber 4



What the future implies ... distributed (hybrid) networks

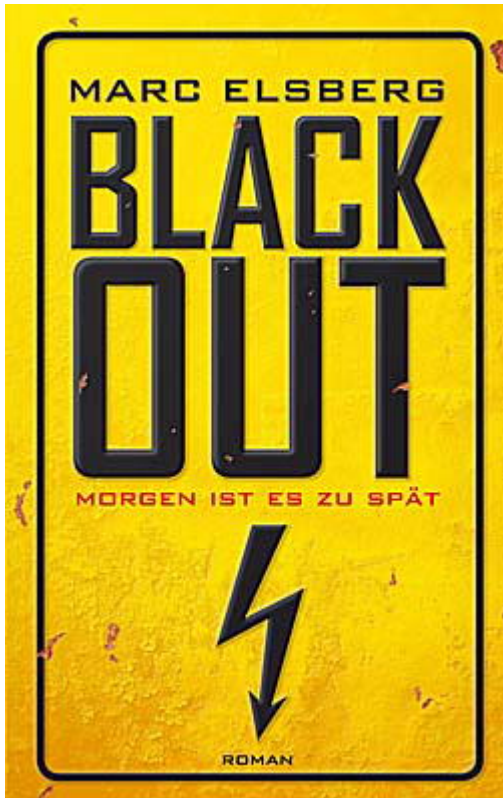
Less resources ... more demand
Climate Change ...
Germany's energy transition

- renewable interconnected energies, solar, wind power etc...
- from unidirectional ... to bidirectional energy flows
- Better energy efficiency ... real time demand-side management
- Peak leveling, prices of electricity are increased during high demand periods, and decreased during low demand periods
- Less redundancy in transmission and distribution lines



Transformation of Energy Market
massive functional differentiation of the
new actors, new interests, new business
new forms of governance (participation)

What does it mean ... for



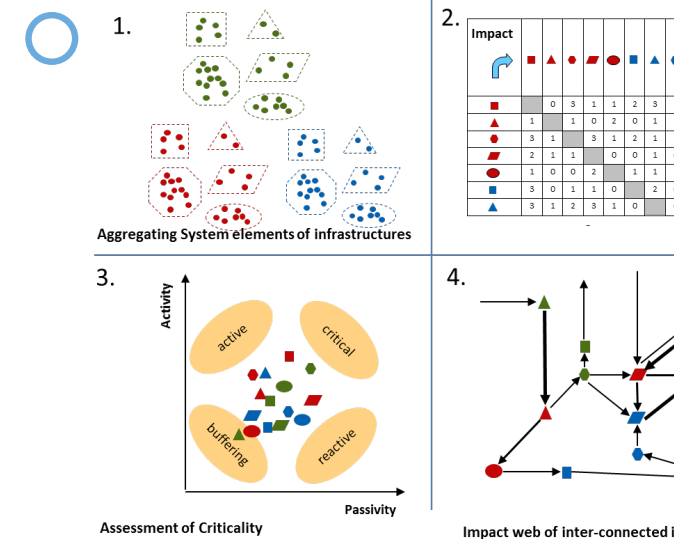
Smart Meters are hacked
and numerous stopped by malware
causing a sudden decrease on
the demand side ...

Security of Supply



IT Security

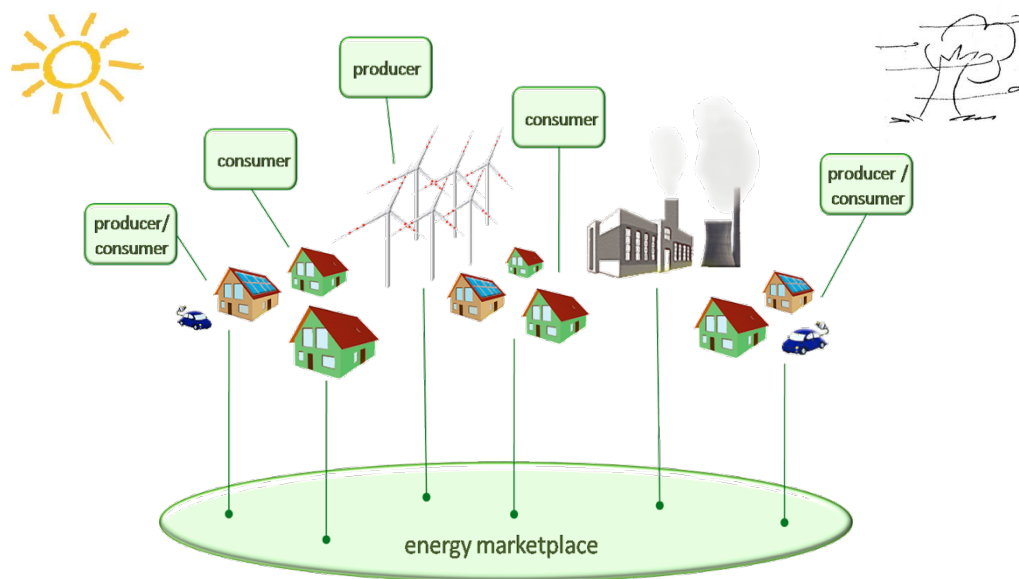
Privacy



Security of Electricity Supply

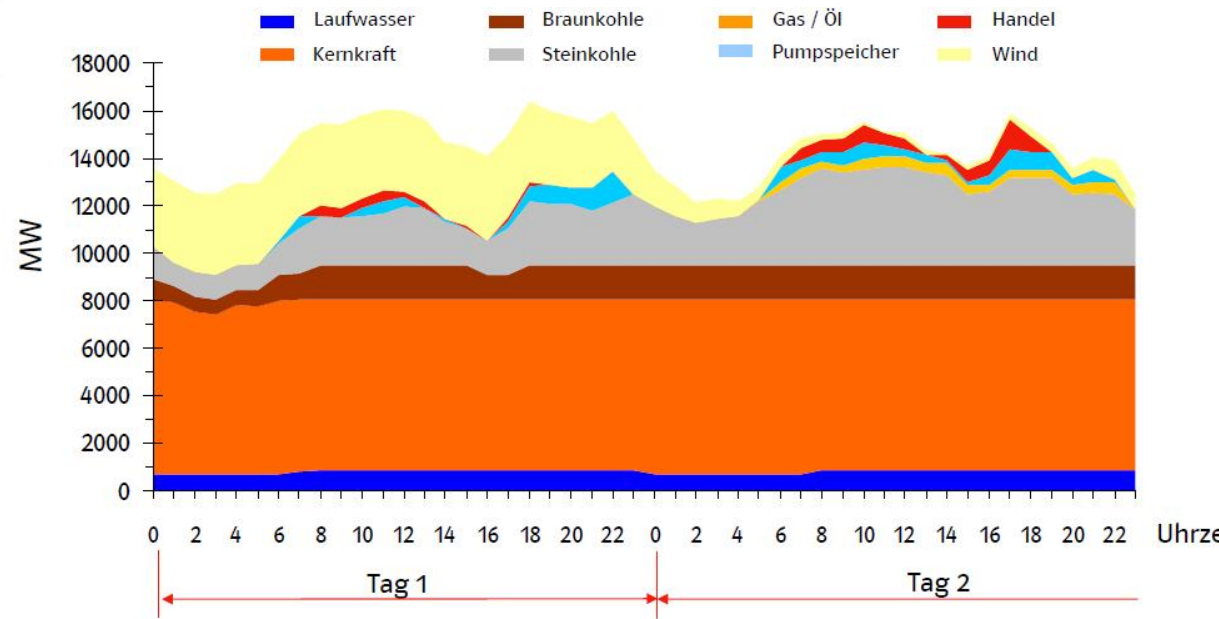
strongly *fluctuating* sources of *electricity* being fed into the grid

weather dependency



Karlsruhe Institute of Technology

load peaks



http://winfwiki.wi-fom.de/index.php/Smart_Grid

maintenance of the grid stability and *security*

IT-Security

Computerworms

Politics and Critical Infrastructure

Cybercrime and Financial Interests

Hacking against physical assets

IT and Internet technologies are increasingly used in industrial environments even down to field devices and sensors/actors
The energy information network can be target, but can also be used as an targeting architecture

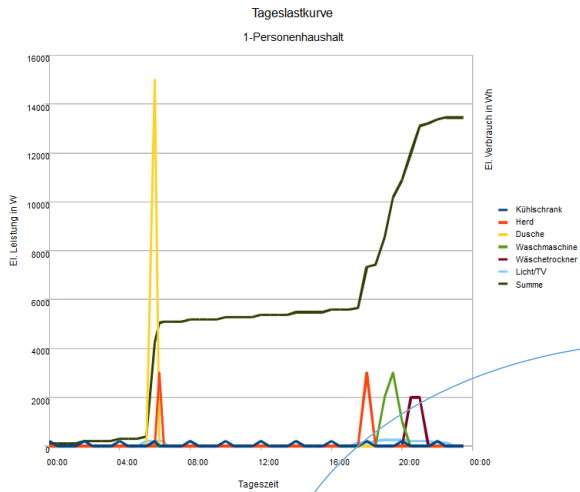
Secure device to device connectivity
Authentication and Authorization
infrastructures are prerequisites
Social engineering has to be taken into account
Security culture must be established within organizations

Industry infrastructures change

Component
Lifetime
Physical Security

More networked embedded systems
Virtualization
Manipulation
Outsourcing
Cloud
Cyber-War-Fare
data mining
Shield and Replay
intellectual property
Compliance enforcement
Anti-virus
standard software
DDoS
Sc
Network
Data
organized crime
International

Data Privacy



<http://upload.wikimedia.org/wikipedia/commons/b/b8/Lastkurve.svg>

Pricing Information

Big Data = Data Mining

Smart Grids = Big Data

Status data

Consumption data

Billing data

Invoice data

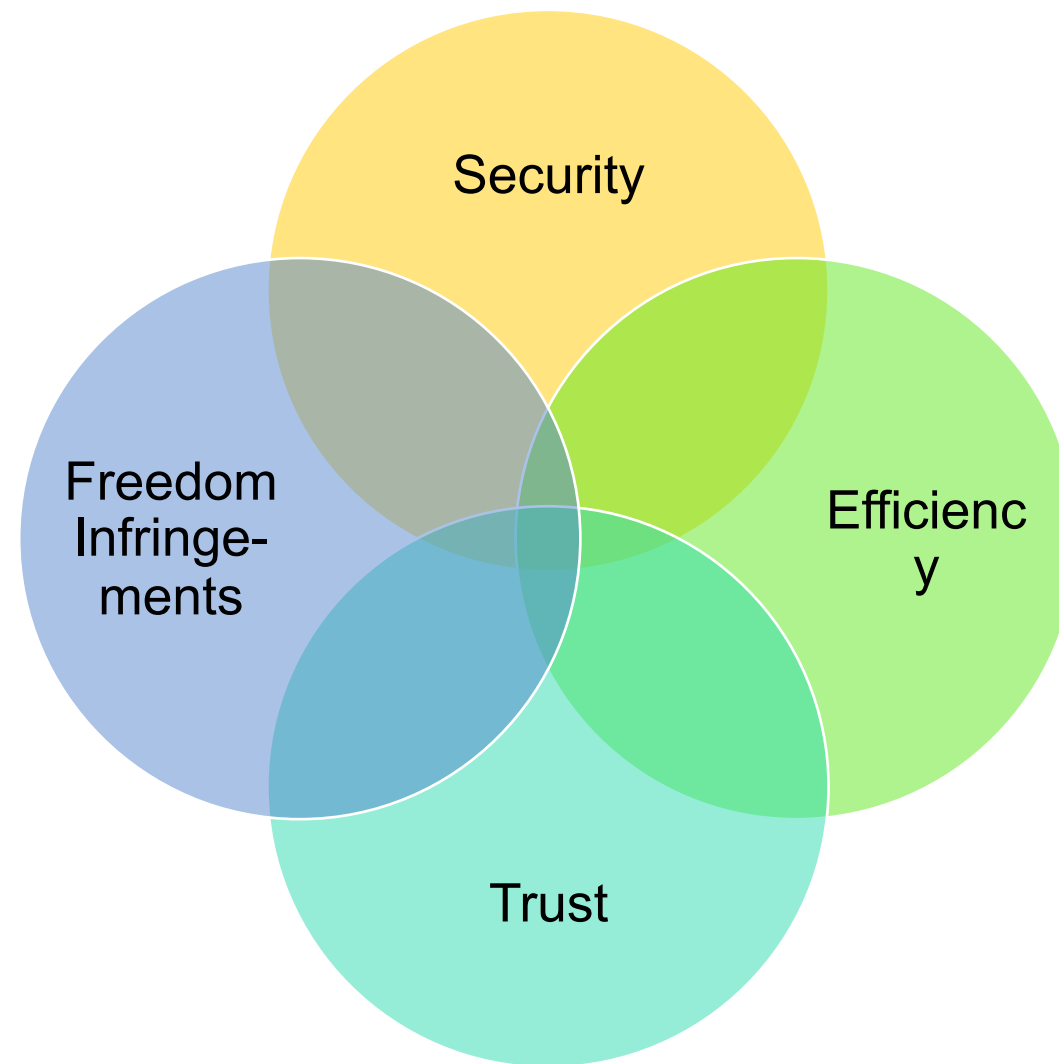
Measured data

Control data

Maintenance data

What are the trade offs?

Data Mining = Profiling



Thank you for your attention