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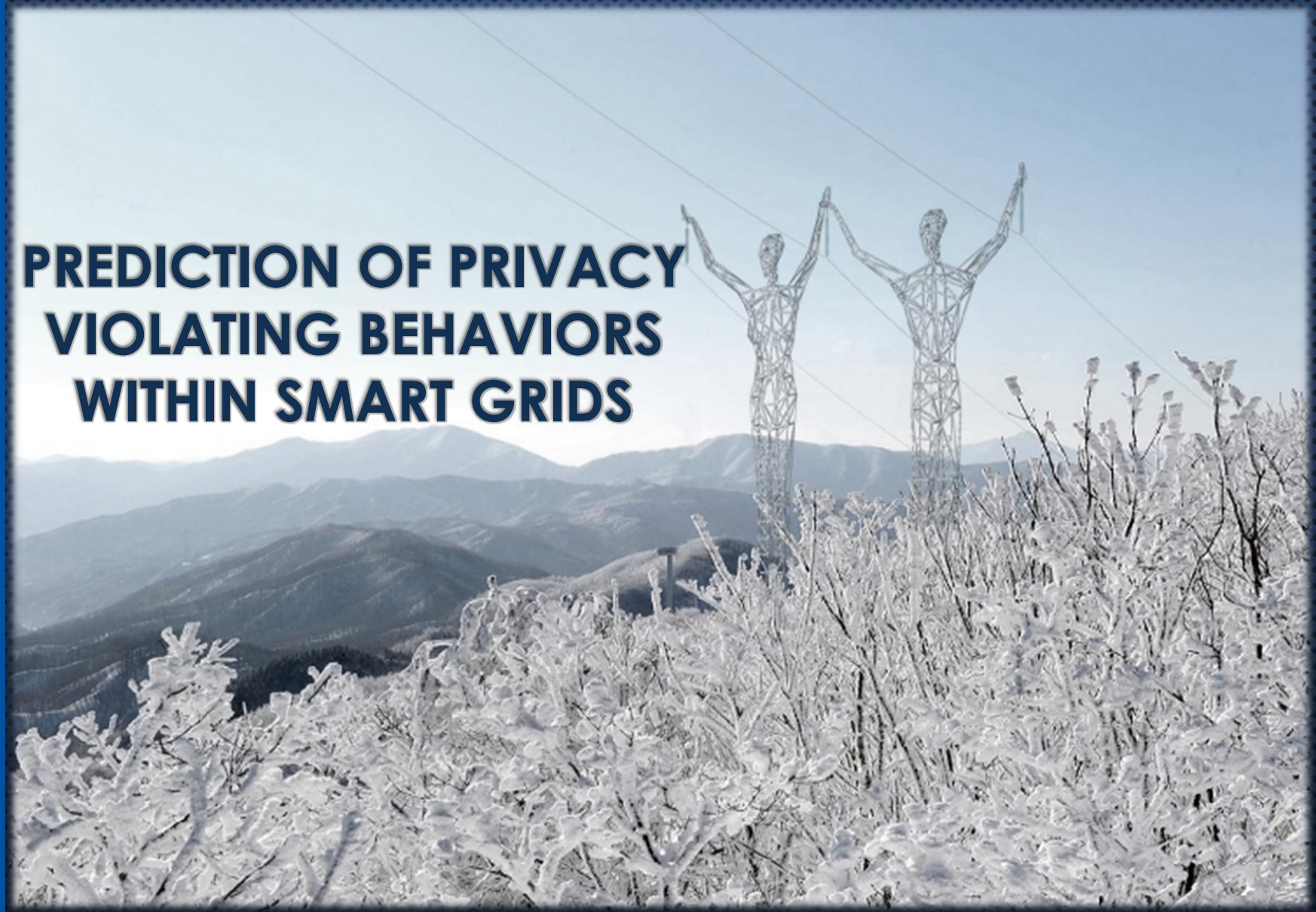
PREDICTION OF PRIVACY VIOLATING BEHAVIORS WITHIN SMART GRIDS



ADAM SZEKERES

GJØVIK

SMART CITY DAY 2016

01.12.2016

About me

- Background in Psychology
- Started PhD studies in Information Security this year
- Research topic on Human motivation – decision making
- Connected to IoTSec project funded by Research Council of Norway

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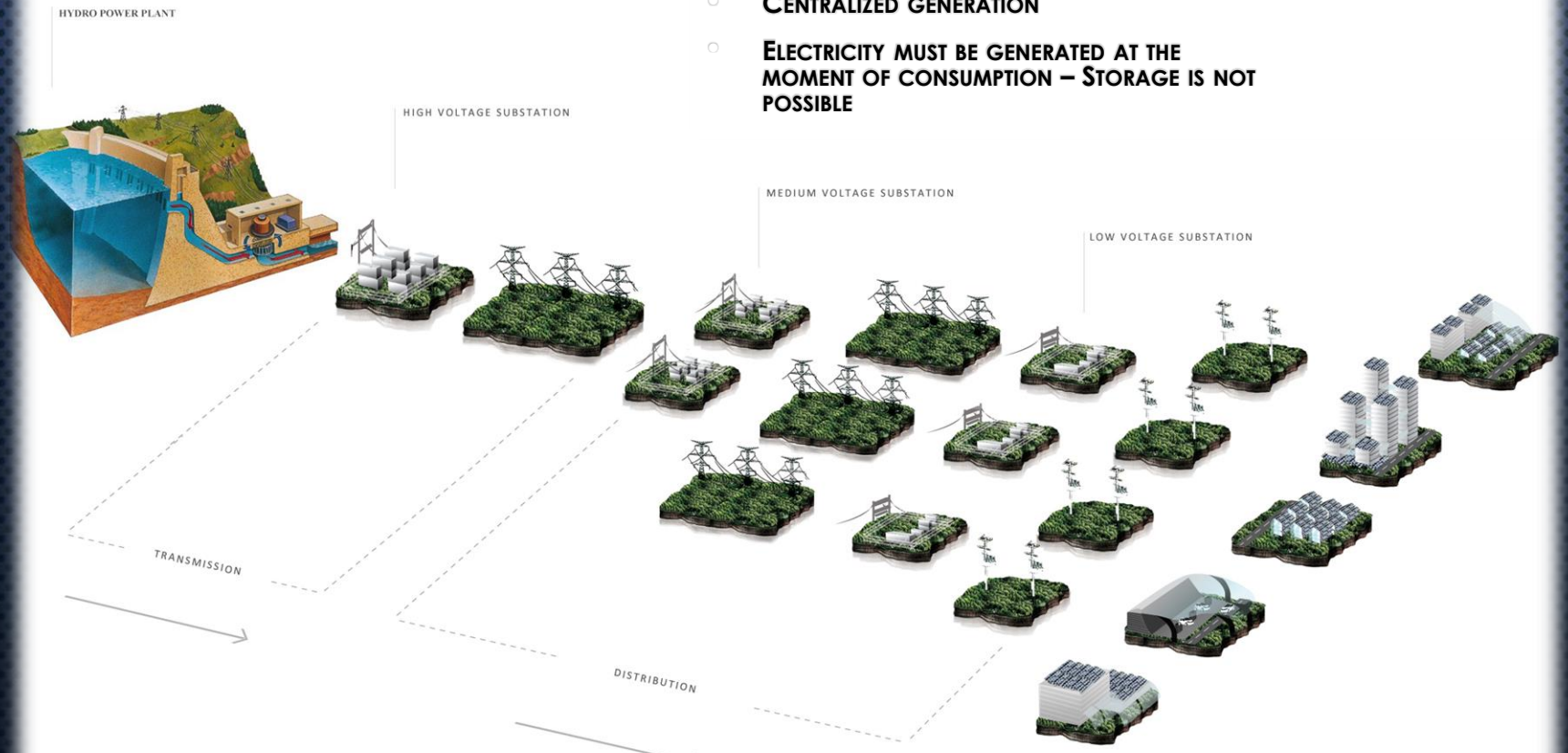
KEY POINTS

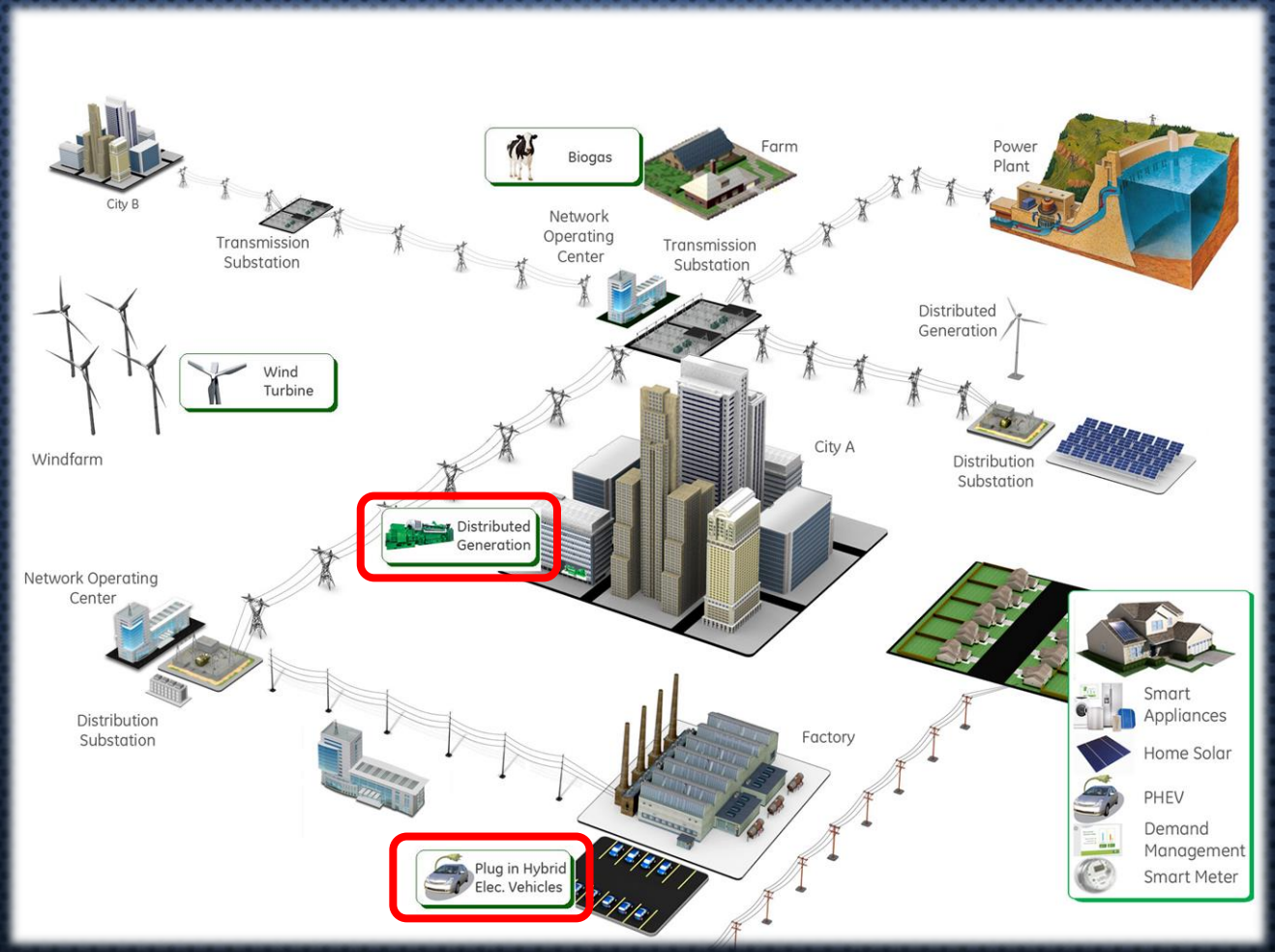
- Evolution of the Smart electric Grid
- Customer Privacy concerns
- Connecting the system to human decision making and risk analysis
- Ideas from psychology for the prediction of strategic decision making

TRADITIONAL ELECTRIC GRID

- CRITICAL INFRASTRUCTURE FOR MODERN SOCIETY
- CENTRALIZED GENERATION
- ELECTRICITY MUST BE GENERATED AT THE MOMENT OF CONSUMPTION – STORAGE IS NOT POSSIBLE



TRANSITION TOWARD A SMART GRID



Bi-directional flow of information & electricity

Enabled by IoT

More efficient operations

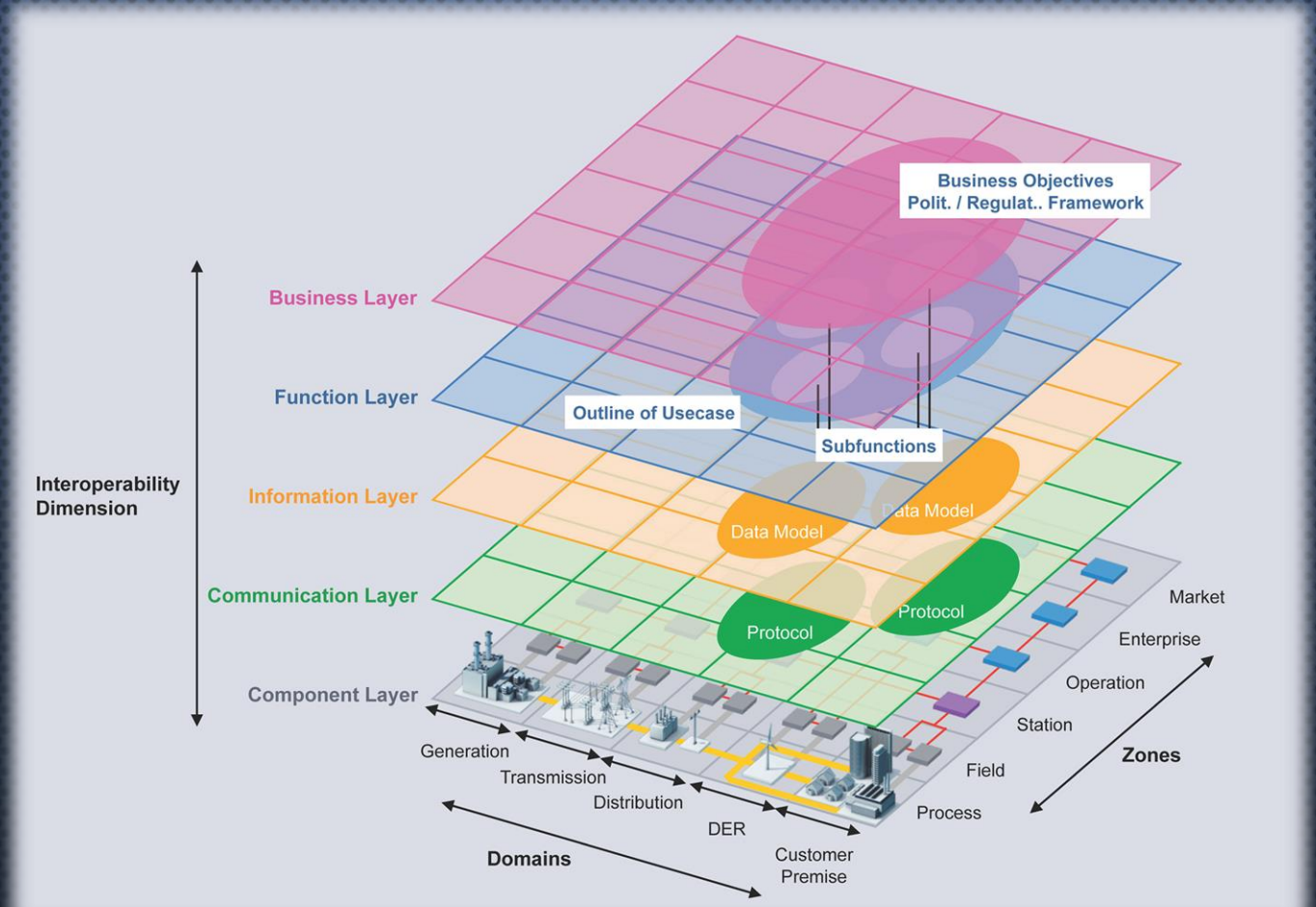
Improved load optimization

Integration of renewable resources

SMART GRID CHARACTERISTICS

- Big Data
- Autonomous systems
- Automated homes
- Consumption based on dynamic prices
- New services/markets for third parties regarding smart homes

THE SMART GRID ARCHITECTURE MODEL



SECURITY REQUIREMENTS RELATED TO SMART METERS

- During data transfer
- During conversions and calculations
- During formatting
- During data storage

Confidentiality, integrity, Availability, authenticity and utility of the data must be ensured.

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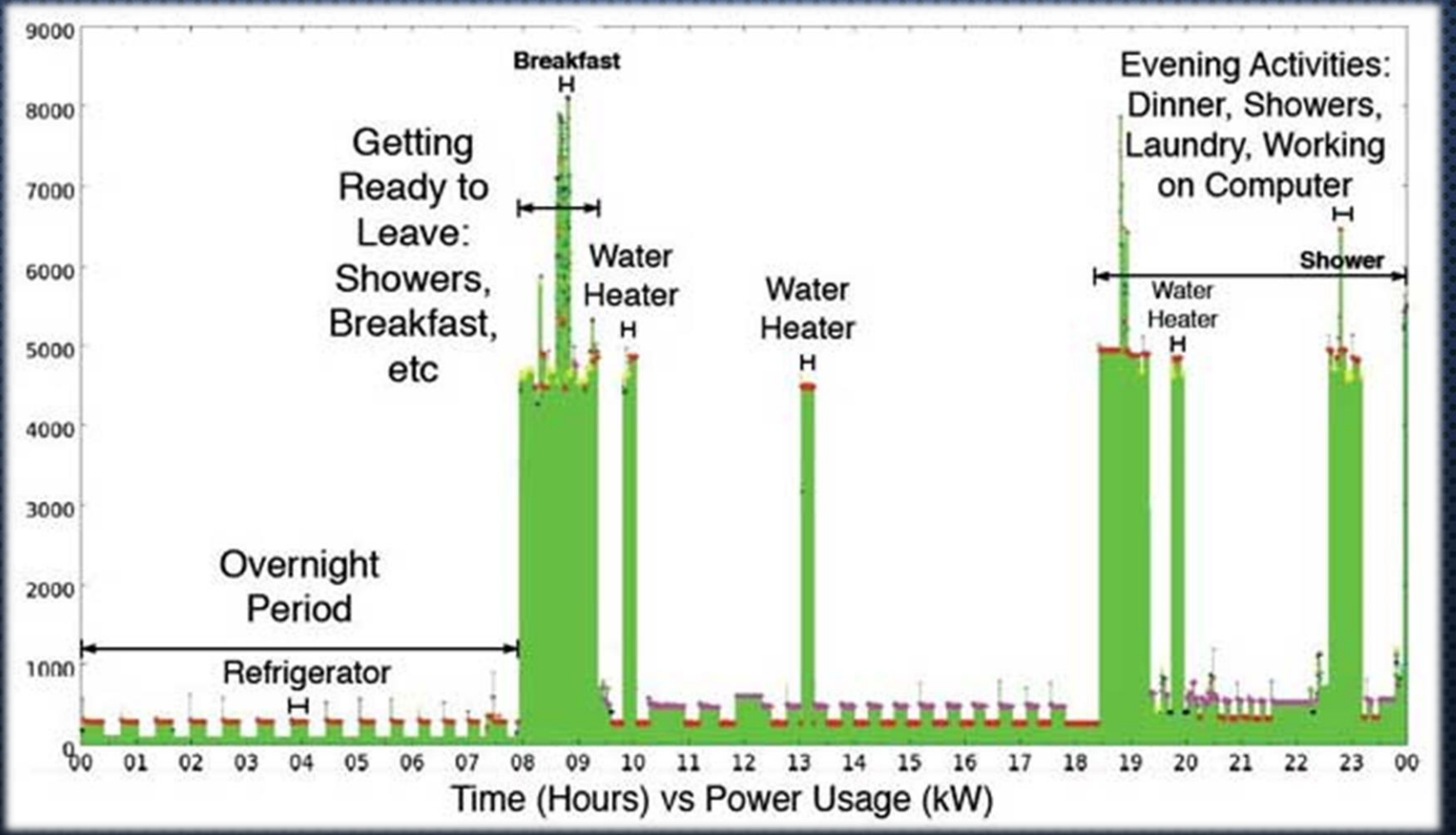
POTENTIAL PRIVACY THREATENING ACTIVITIES

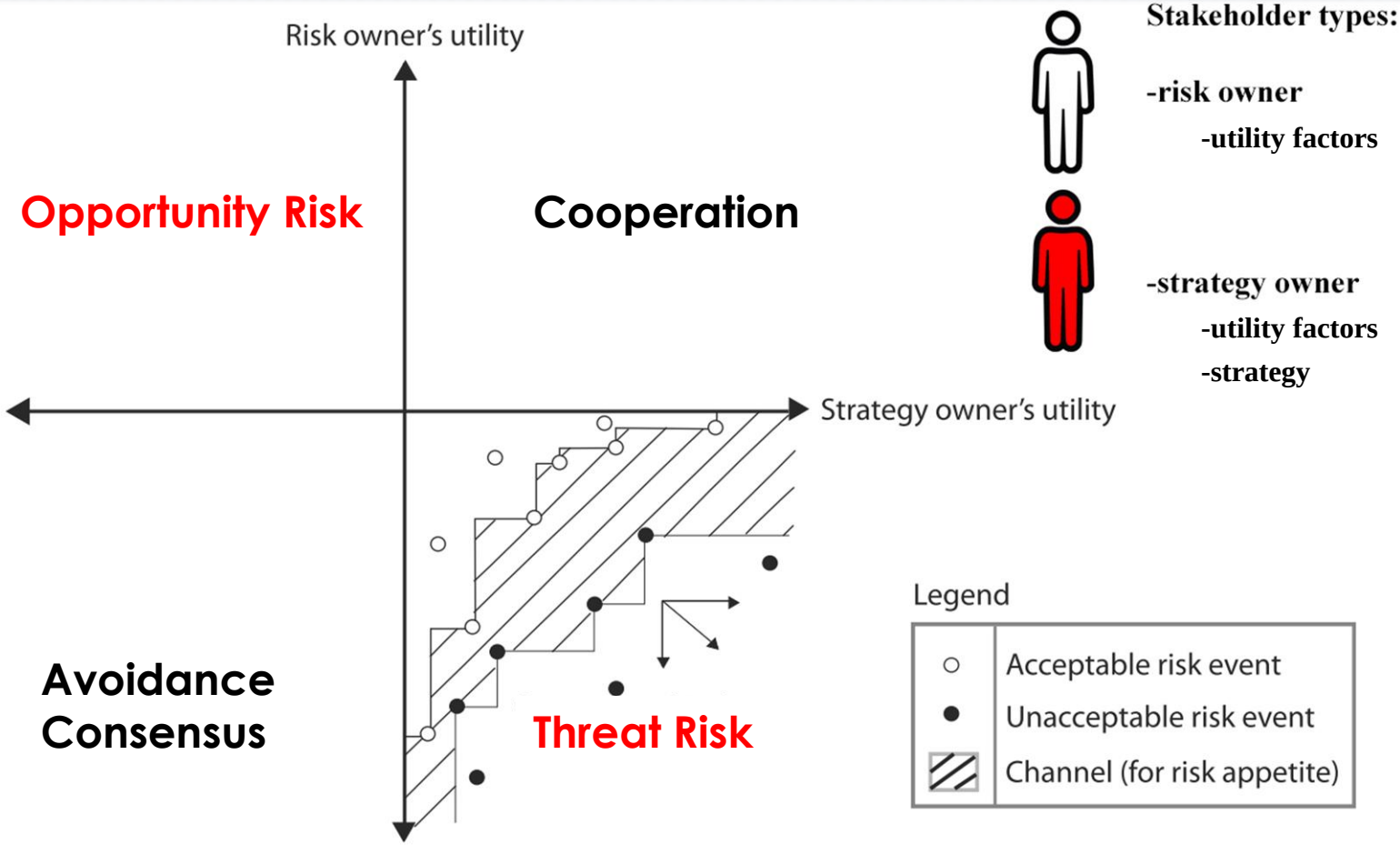
- Information Collection
  - **1. Surveillance**
  - 2. Interrogation
- Information Processing
  - **1. Aggregation**
  - **2. Identification**
  - **3. Insecurity**
  - **4. Secondary Use**
  - 5. Exclusion
- Information Dissemination
  - 1. **Breach of Confidentiality**
  - 2. Disclosure
  - 3. Exposure
  - **4. Increased Accessibility**
  - 5. Blackmail
  - 6. Appropriation
  - 7. Distortion
- Invasion
  - 1. Intrusion
  - 2. Decisional Interference

A PRIVACY CONCERN



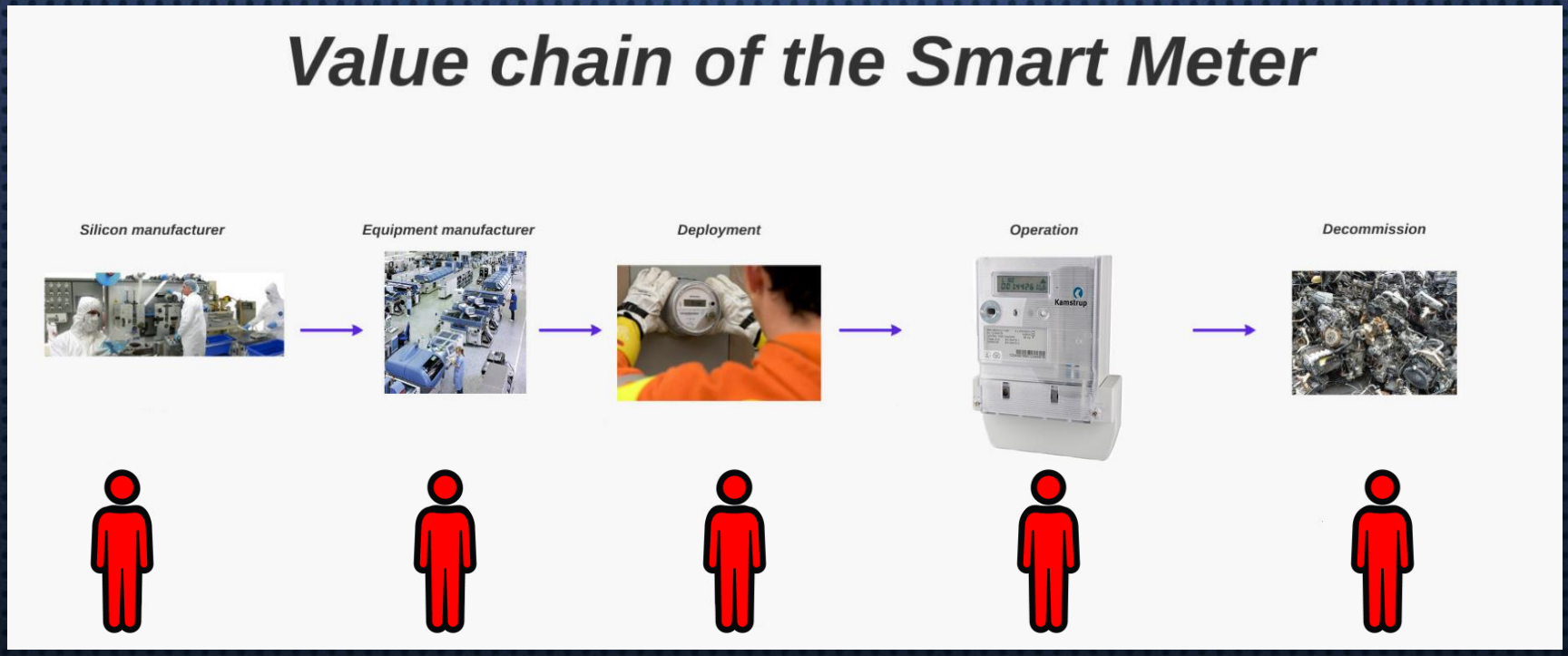
Profiles based on fine-grained electricity consumption

RISK ANALYSIS FOCUSING ON HUMAN BEHAVIOR (CIRA)



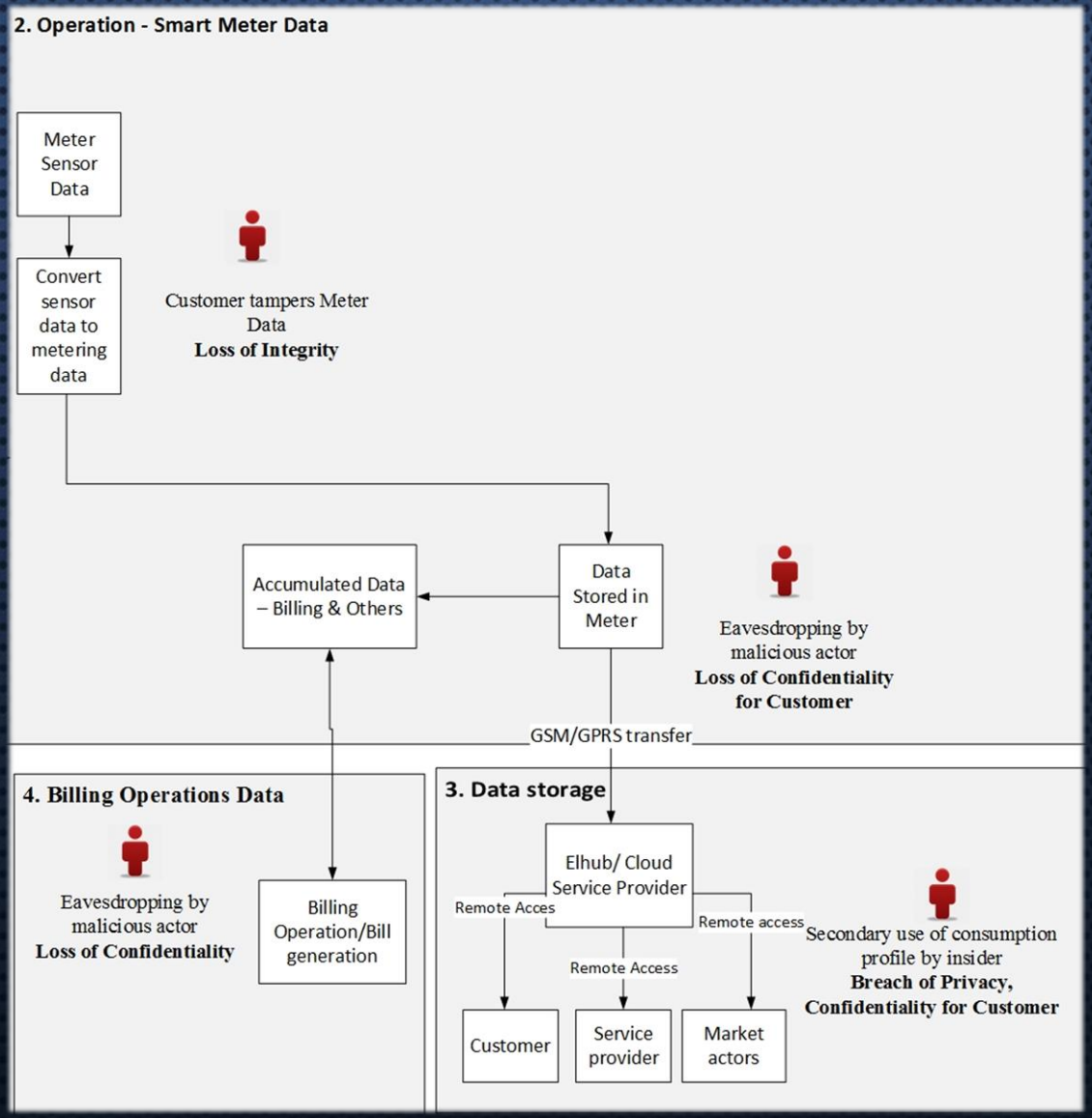
Incentive graph

WHO IS RESPONSIBLE TO FULFILL THE REQUIREMENTS?

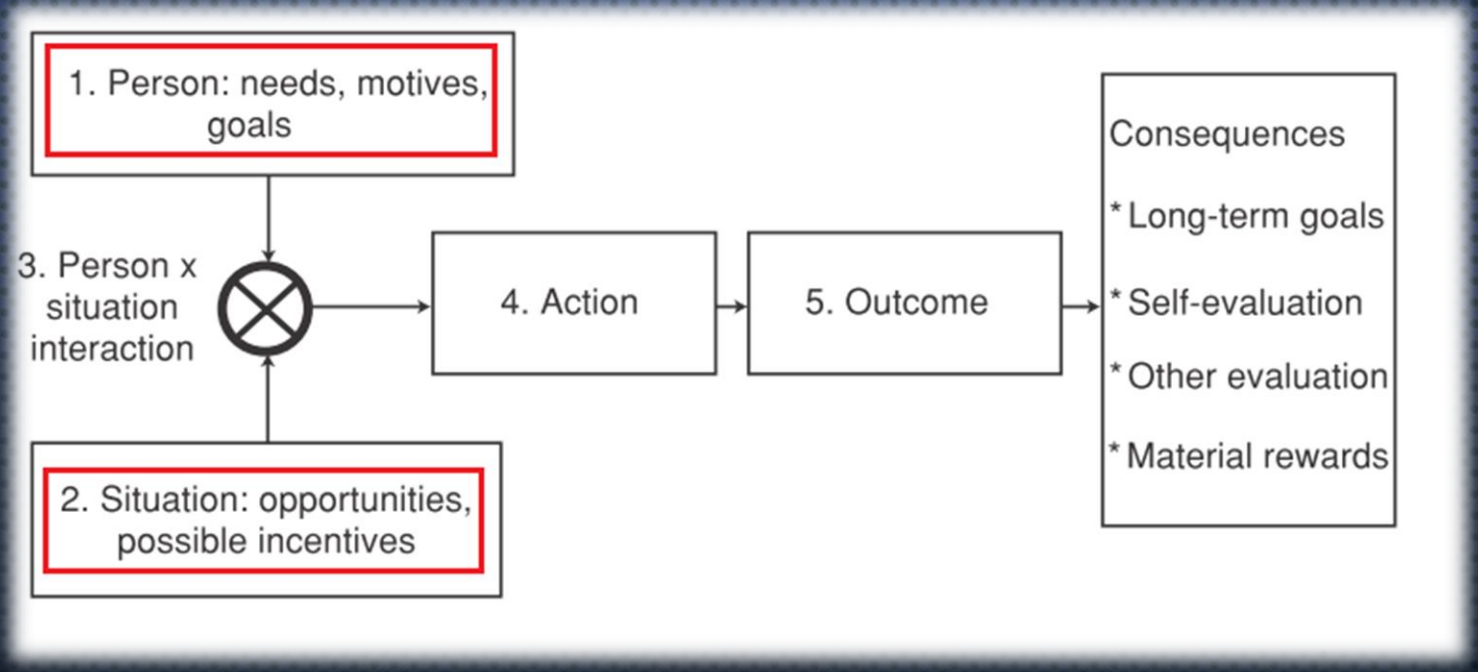


Reliance on third-parties

SIMPLIFIED DATA FLOW MODEL OF THE SMART METER



HUMAN BEHAVIOR



SITUATIONAL FACTORS

- ORGANIZATIONAL CULTURE (VALUES, NORMS..)
- FINANCIAL (BONUS SYSTEMS SHARE SCHEMES), MORAL, COERCIVE INCENTIVES

PERSONALITY FACTORS

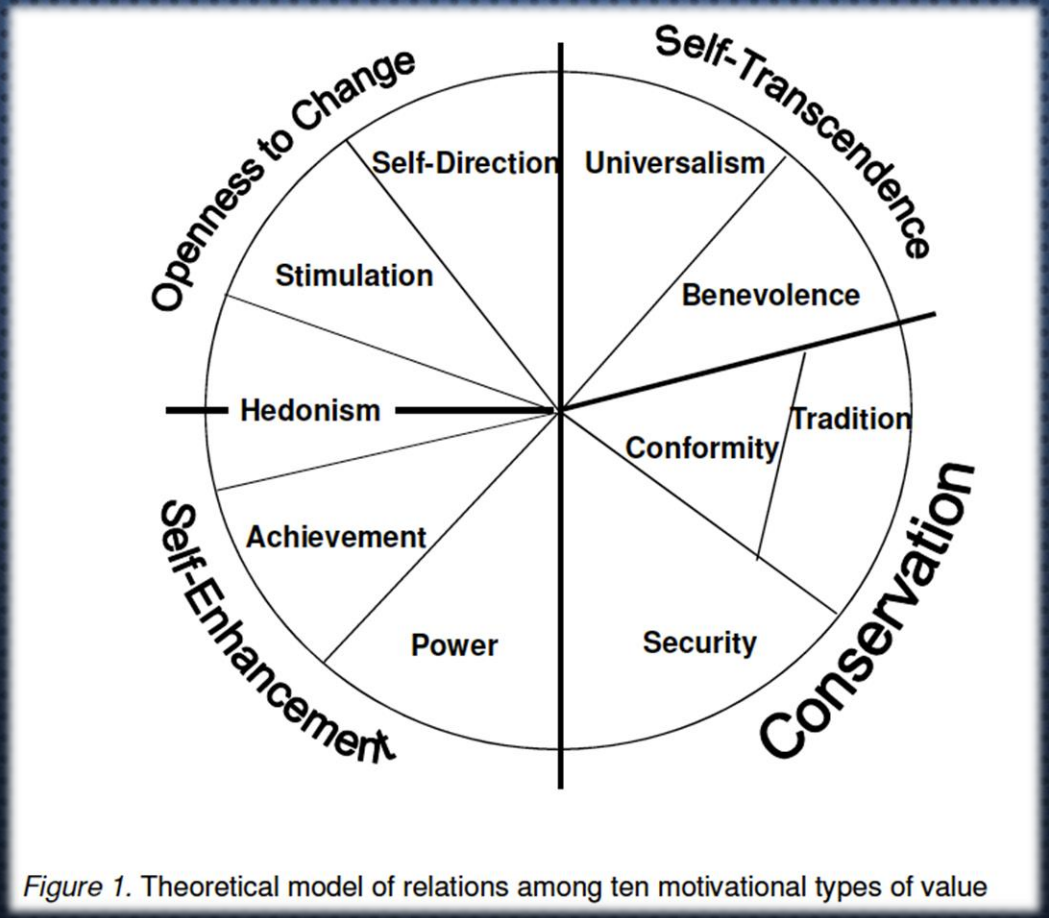
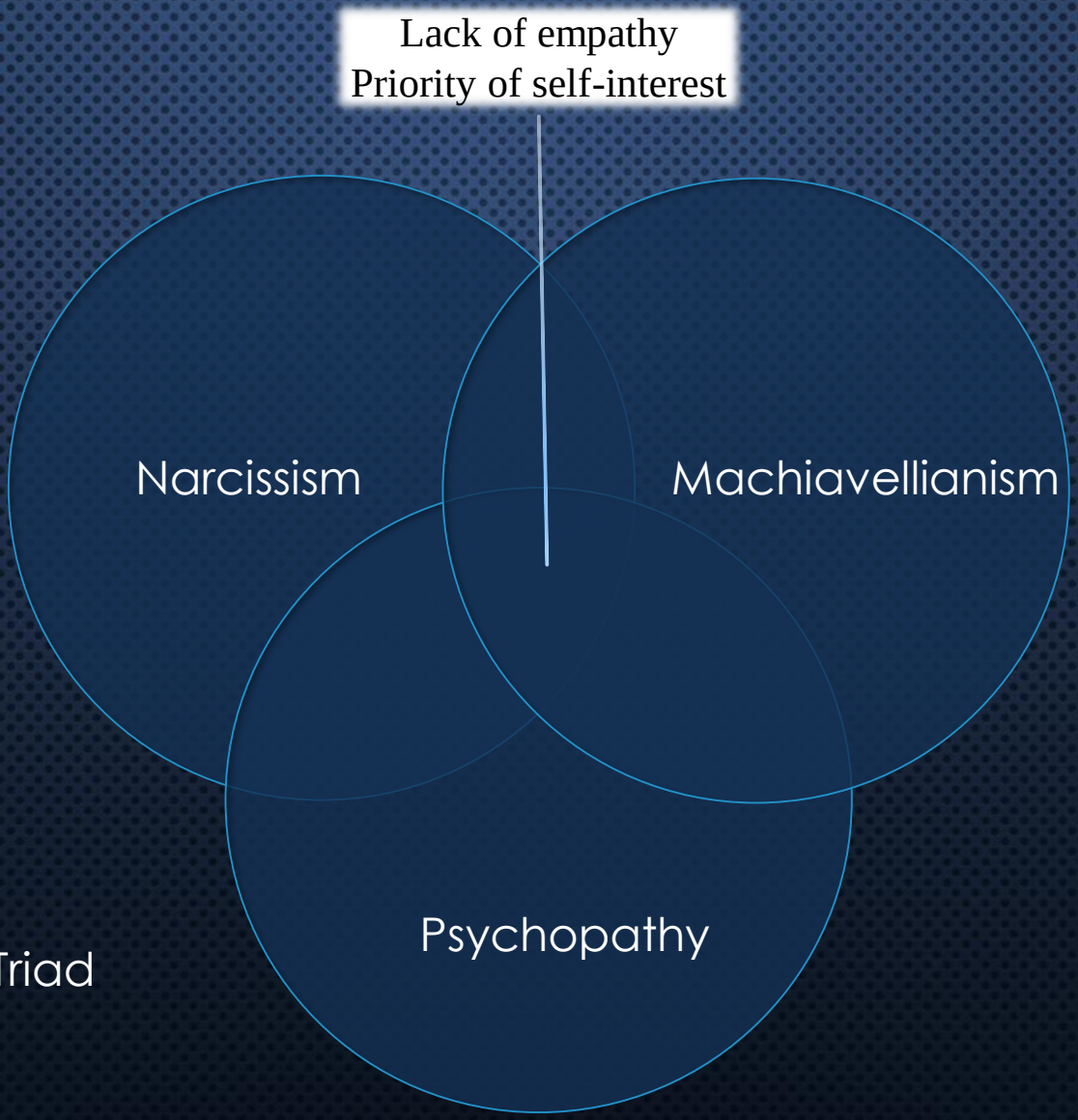


Figure 1. Theoretical model of relations among ten motivational types of value

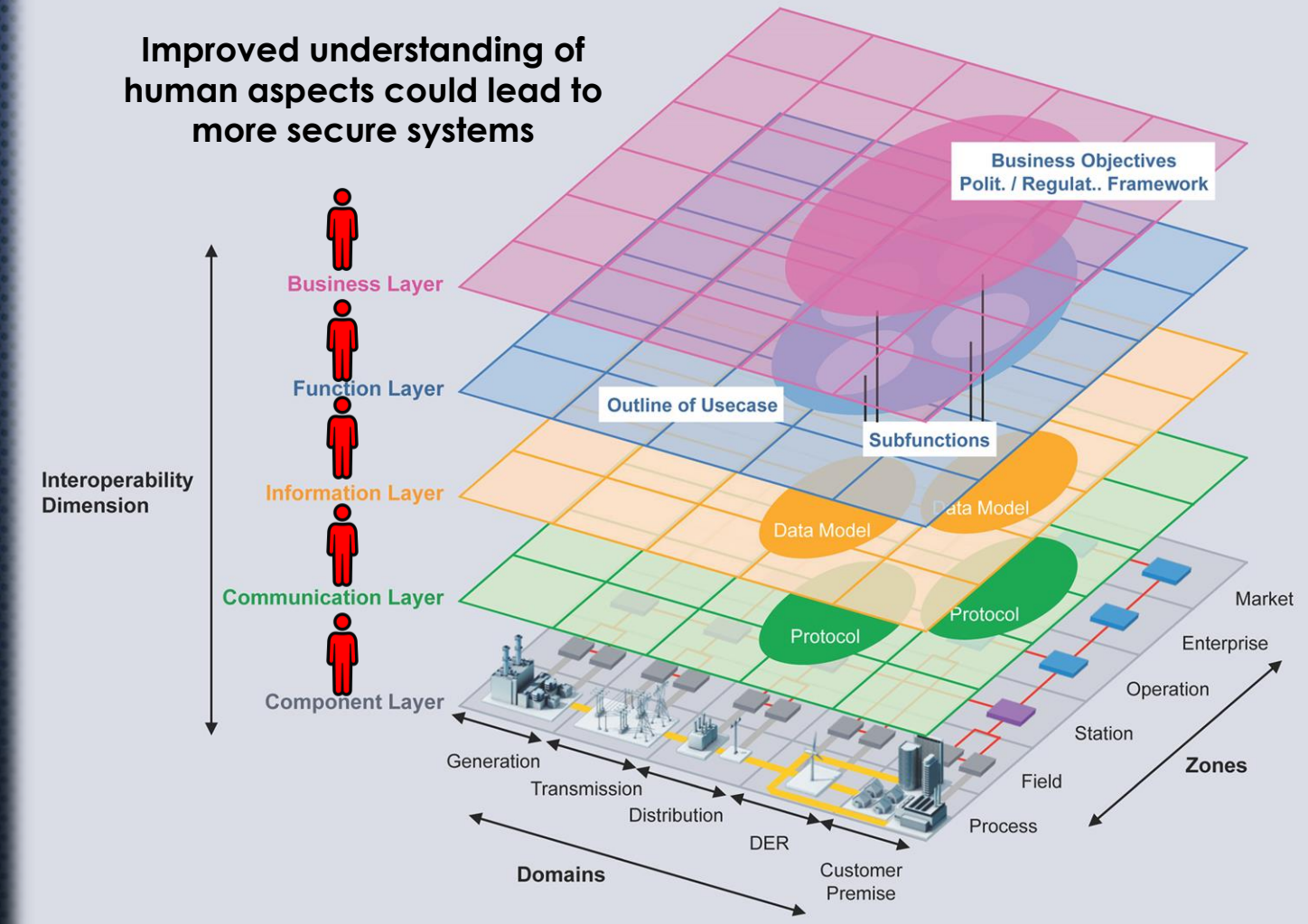
Basic Human Values

PERSONALITY FACTORS



The Dark Triad

TAKE-HOME MESSAGE



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Thank you for your attention!