# Novel paradigms for distribution grid energy management

Workshop SEIDO

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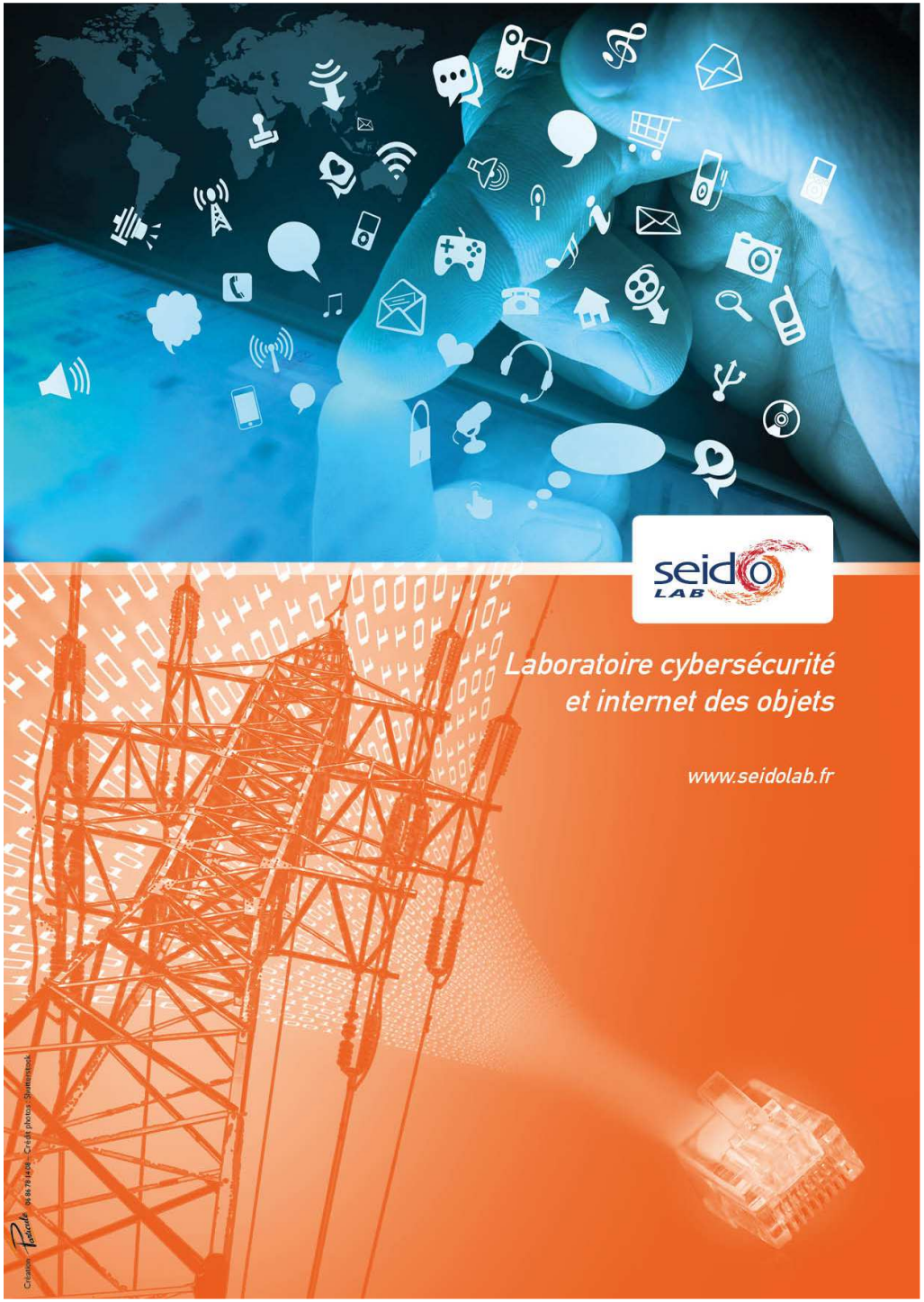
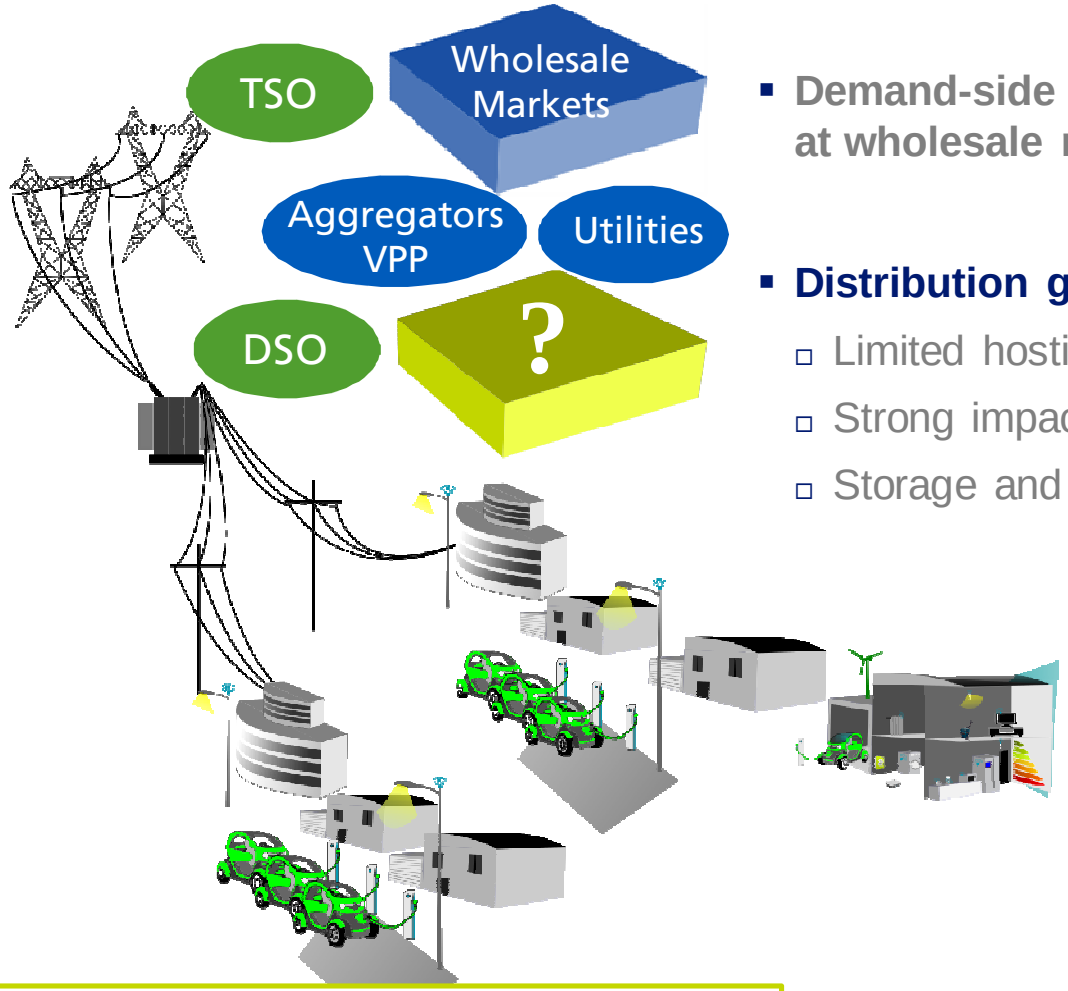


# DISTRIBUTION GRID CHALLENGES

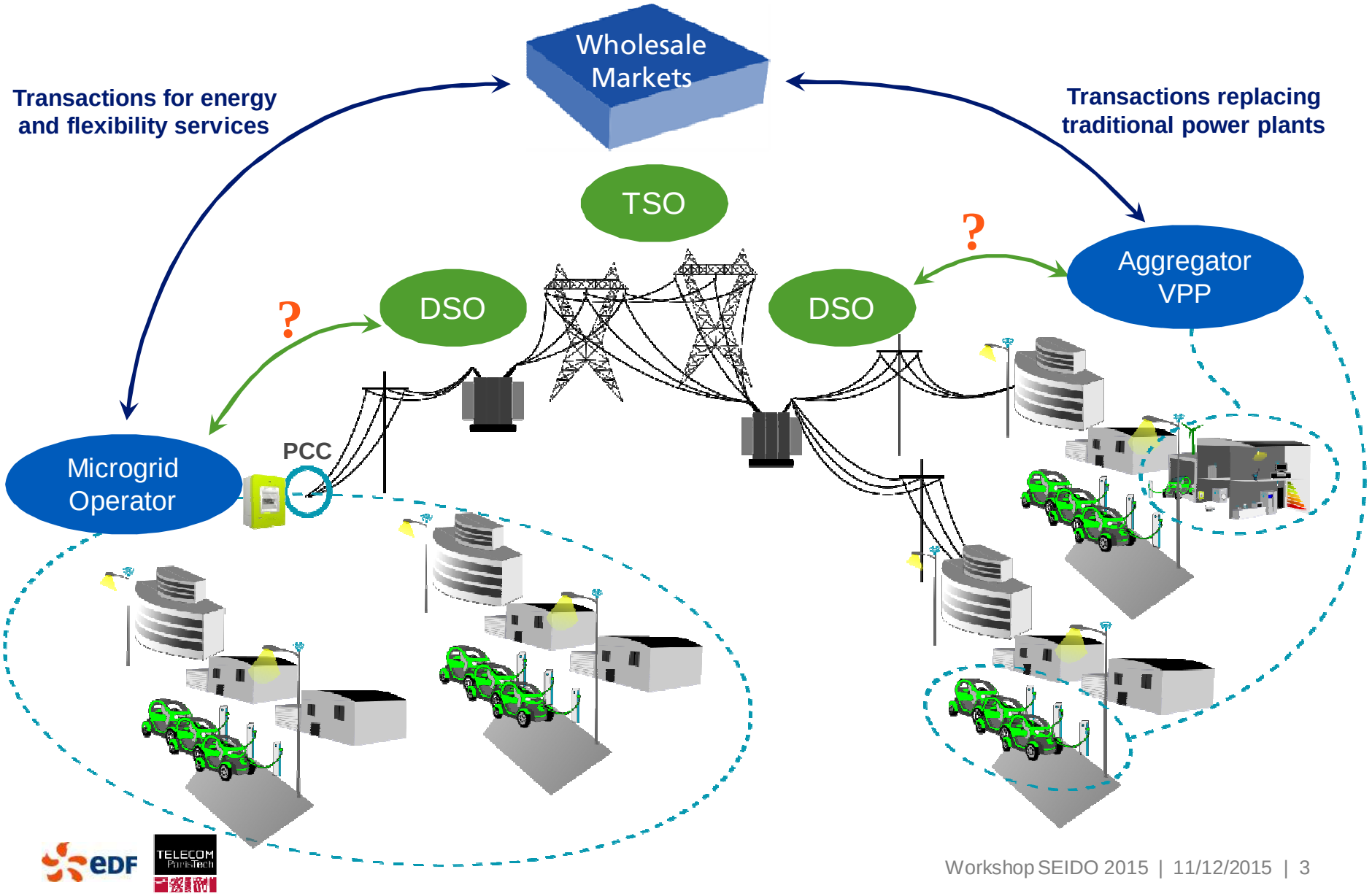



- **Demand-side flexibility is already being exploited at wholesale markets.**
- **Distribution grids need demand-side flexibility:**
  - Limited hosting capacity for EVs and variable RES
  - Strong impacts on availability and quality of supply
  - Storage and BEMS may worsen such impacts

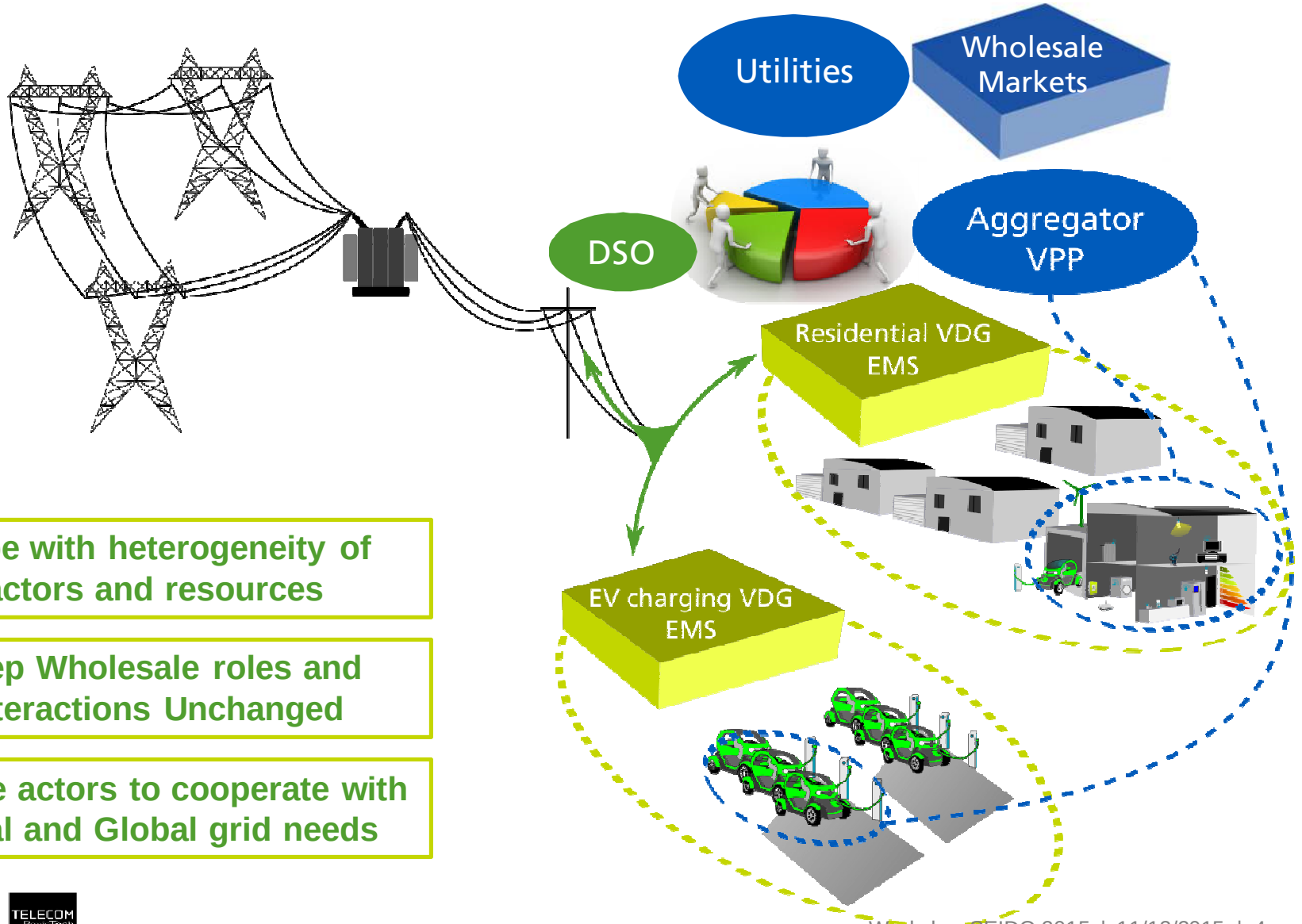
**A new distribution grid energy management architecture is needed**

- **Smart homes introduces a new opportunity: Energy/power Flexibility**

# CURRENT APPROACHES TO DER MANAGEMENT



# “VIRTUAL” DISTRIBUTION GRID APPROACH

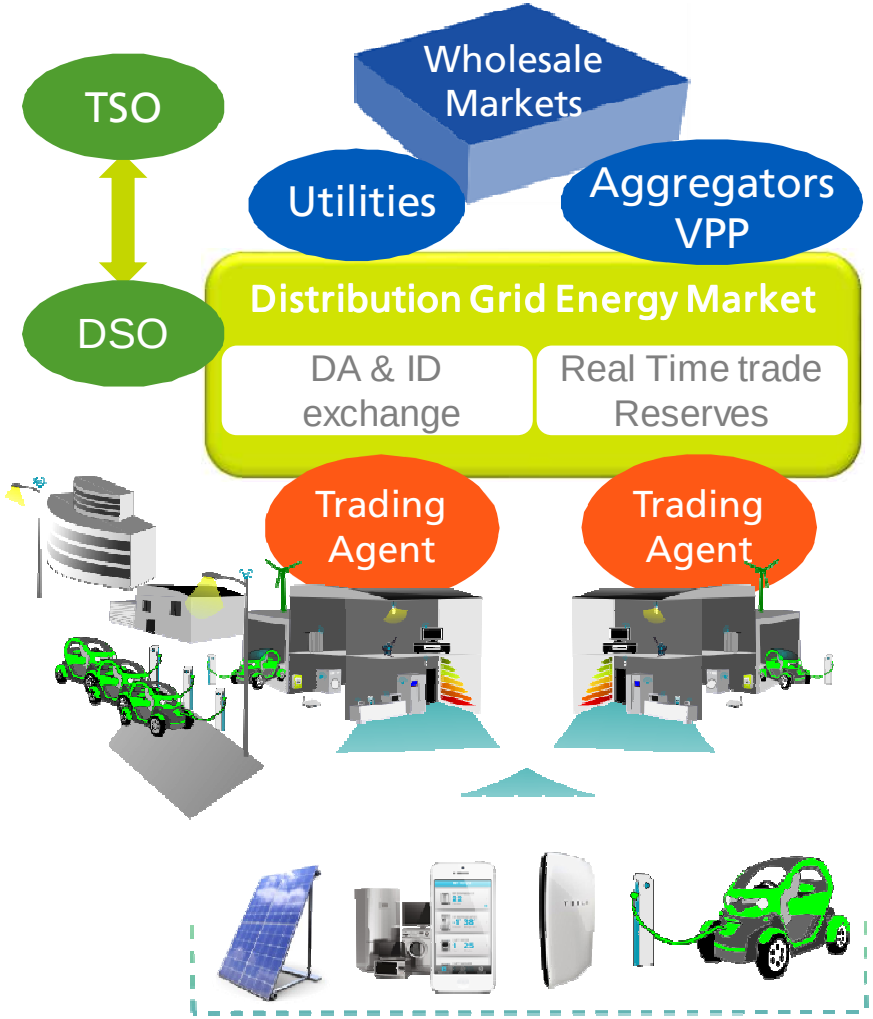


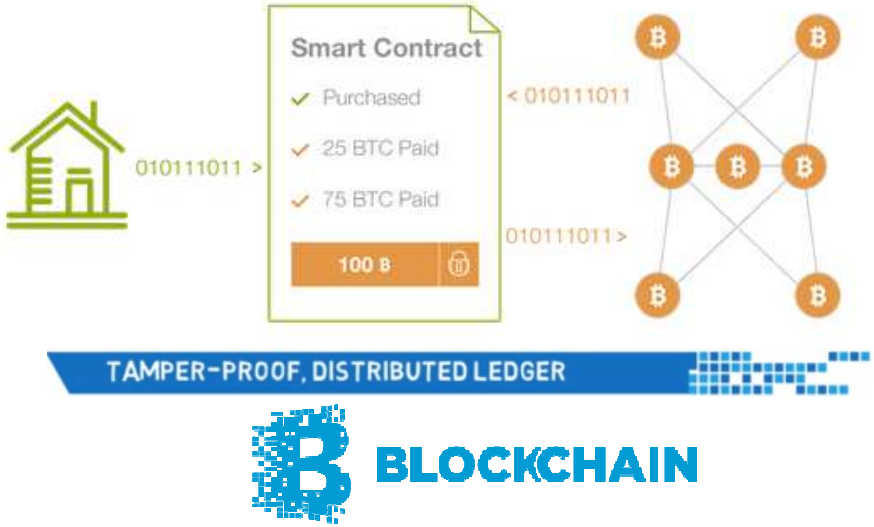

**Cope with heterogeneity of actors and resources**

**Keep Wholesale roles and Interactions Unchanged**

**Enable actors to cooperate with Local and Global grid needs**

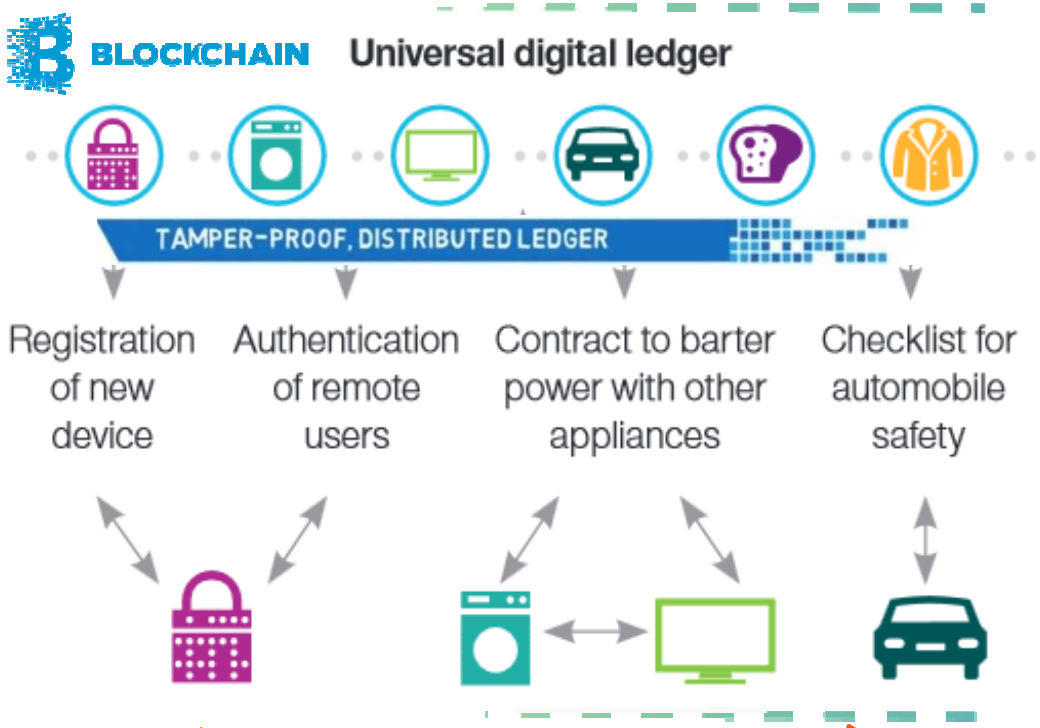
# ENERGY MANAGEMENT ON A RESIDENTIAL VDG



## Smart Home Service Goals

- Healthcare & wellbeing
- Safety & Security
- Efficiency & Ease of life
- Comfort, & Entertainment




- ✓ Conflicts among controllers
- ✓ Security & Privacy
- ✓ Interoperability

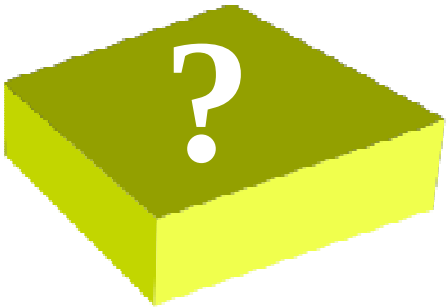
# CONTRIBUTIONS AND NEXT STEPS

- **Internet of Things Architecture for Smart Home Energy Services – Submitted to IEEE Magazine**
  - Providing a comprehensive state of the art on IoT technologies for the Smart Home.
  - Defining a general architecture for the provision of energy services.
- **Novel agent-based paradigms for advanced distribution grid energy management – Submitted to AAMAS 2016**
  - Introducing Virtual Distribution Grids (VDG) concept.
  - Proposing a market-based Energy Management mechanism and an innovative blockchain-based implementation.
  - Proposing improvements to the general Smart Home architecture in terms of Conflict resolution, security and privacy.

# NEXT STEPS

- **Design, Implement and evaluate a Distribution Grid Energy Management Market using Blockchain.**
  - Target: ACM e-energy 2016 (Deadline: February 5, 2016).
- **Design, Implement and evaluate on-premises Event-Condition-Action mechanisms over a Blockchain-based platform.**
  - Target: SmartGridComm 2016 (Deadline: April 24, 2016).
- **Write the thesis manuscript from May 2016.**

# THANK YOU




Questions, remarks, …

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