



Research Questions

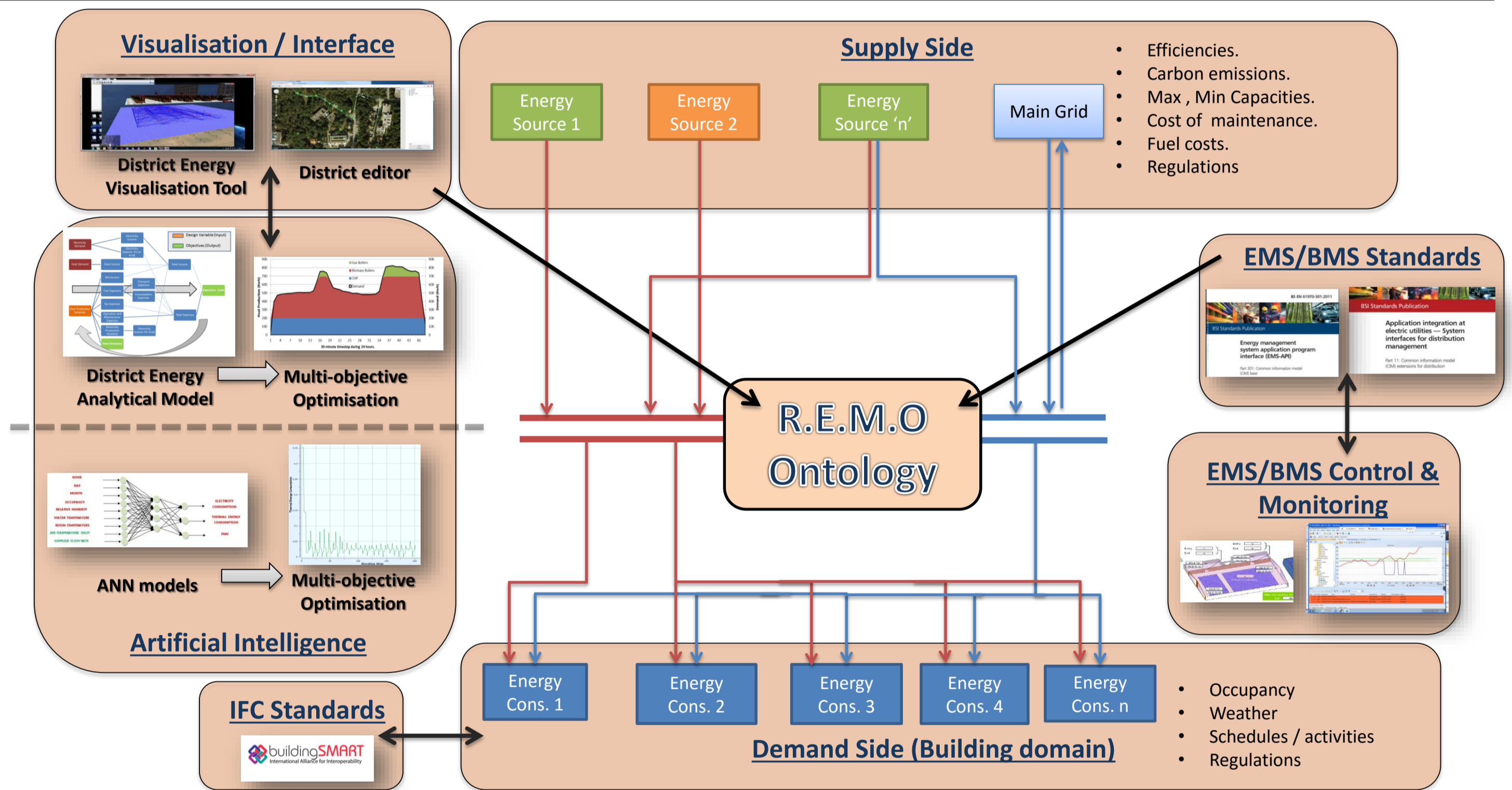
- How can **operational data knowledge** help reduce this performance gap .
- Linking buildings and districts , how best to take a **multi-level approach** for energy management.
- What objectives/constraints should be considered for a **holistic energy management decision**.
- Can an **ontological approach** help conceptualise this theory.

Research gap

- In Europe, appropriate Building management systems (BMS) use can **save up to 50 % of the energy used**. (Huber et al., 2015)
- Important to consider not just **buildings alone but their interactions in an urban context**. (Allegrini et. al, 2015)
- Urban energy model **should capture both supply and demand** within a local context considering energy production, storage, transportation, and **conversion to end service**. (Keirstead,2012)
- an urban energy model must be capable of incorporating a broad spectrum of technologies and should leverage existing methodologies through a **common ontology**

AIM

An ontological approach to energy management for buildings and their districts using artificial intelligence.



Research Approach

- **Action Research** – Experience gained from involvement
 - EU FP7 – Spote2 (Building scale)
 - EU FP7 – Resilient (District scale)
- **Grounded theory approach** - Reflective process of progressive problem solving.
- Working with **stakeholders** to address problems through use cases/scenarios
- Scope of research: Operational stages.

Research outputs

- District energy optimization technique using multi objective genetic algorithms.
- **R.E.M.O Ontology** for aiding facility managers in decision making.
- Boost to BIM for holistic energy analysis

Publications

- Jayan B, Li H, Rezgui Y, Hippolyte J-L, Howell S.K, An analytical optimization model for holistic Multi-Objective District Energy Management - A case study approach, International Journal for Modelling and Optimization , 2016
- Jayan B., Li H., Rezgui Y., Hippolyte J.L., Yuce B., Yang C., Petri I., An ontological approach to intelligent energy management in buildings, EGICE conference, July 2014.

Title - An ontological approach to energy management for buildings and their districts using artificial intelligence.

Supervisors - Dr. Haijiang Li
Prof. Yacine Rezgui