



Overview of Smart City activities in R.C. ENEA Casaccia

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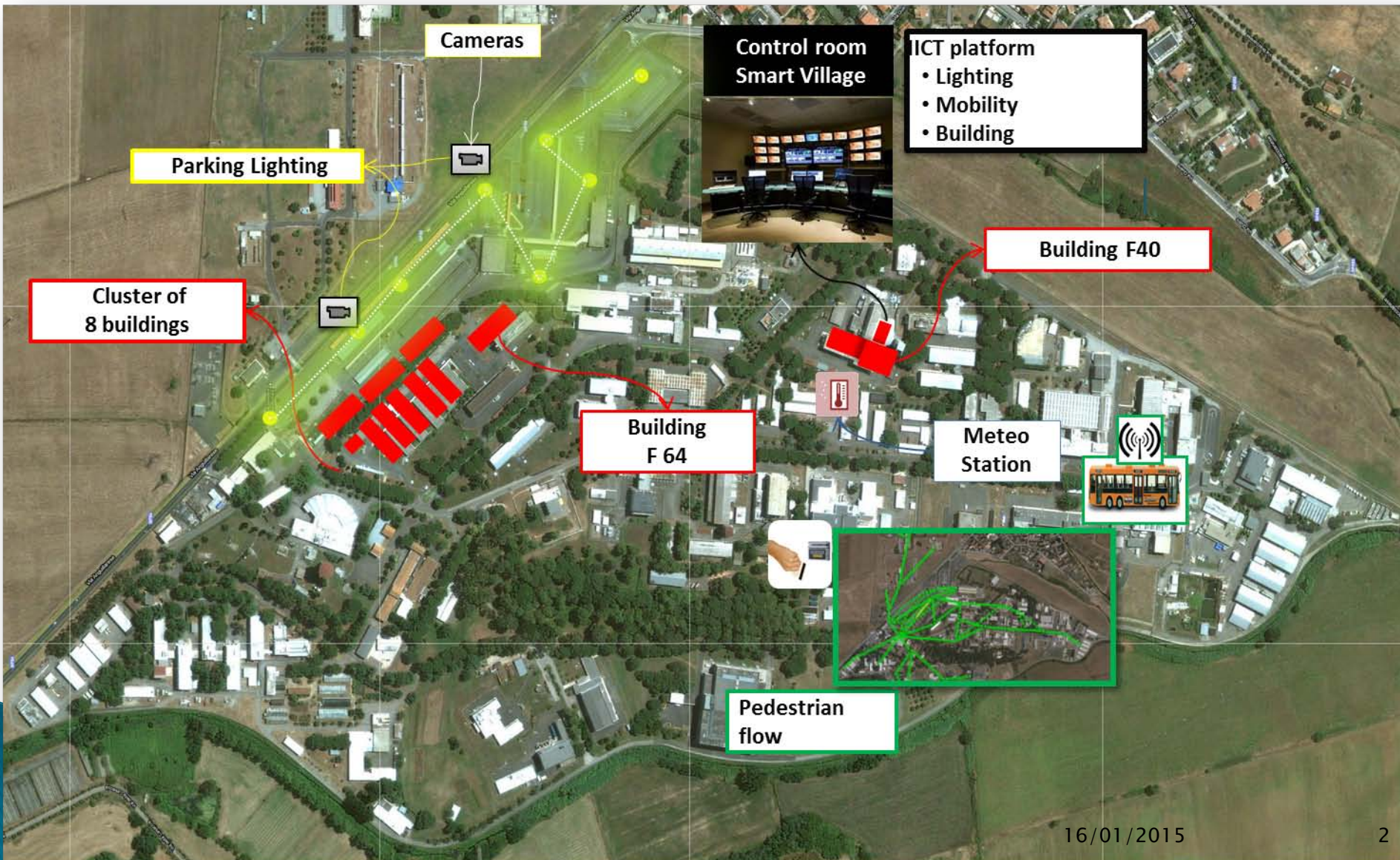
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Outline

- ▶ Development of a “Smart Village” in R.C. ENEA Casaccia
- ▶ Development of IT platform for data retrieving and actuation
- ▶ Building Diagnostics through fuzzy data fusion
- ▶ Building optimisation based on Multi Objective Genetic Algorithms

Smart Village ENEA Casaccia

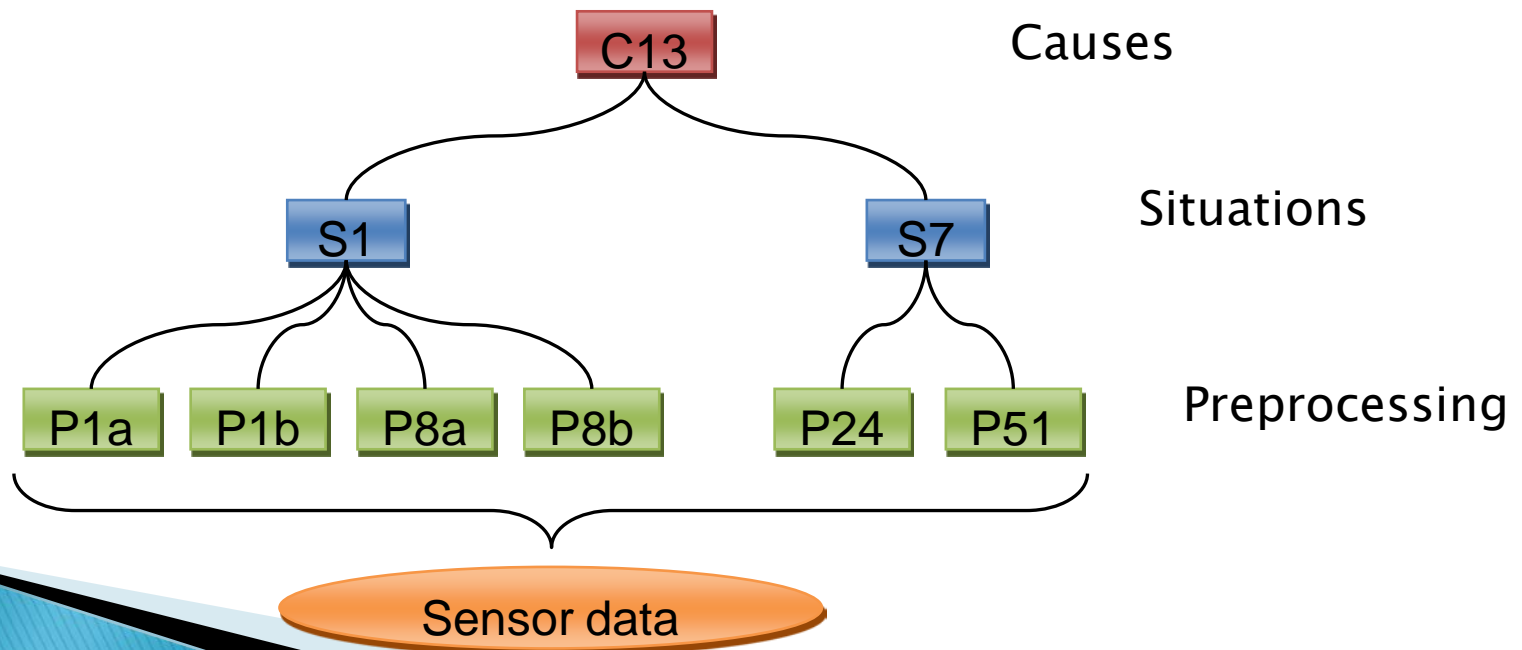


Integrated Platform architecture



Diagnostics process

- ▶ Finding anomalous behavior of the building (e.g. thermostat valve stuck, indoor lighting turned on outside working time...)
- ▶ 3 levels of information knowledge, from the lowest abstraction to the highest

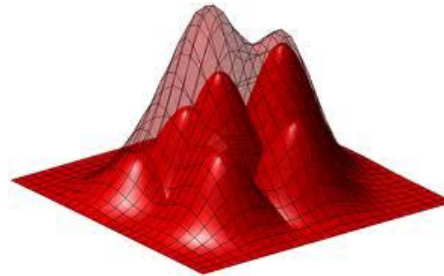
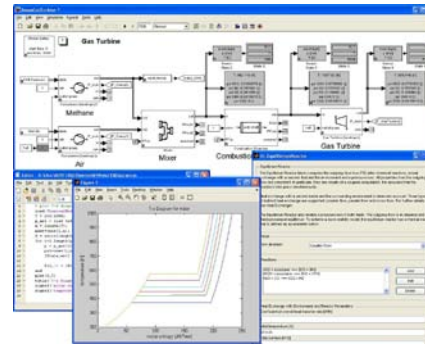


HVAC control process

Data acquisition



Simulator/Model



Optimisation



Setpoint Control

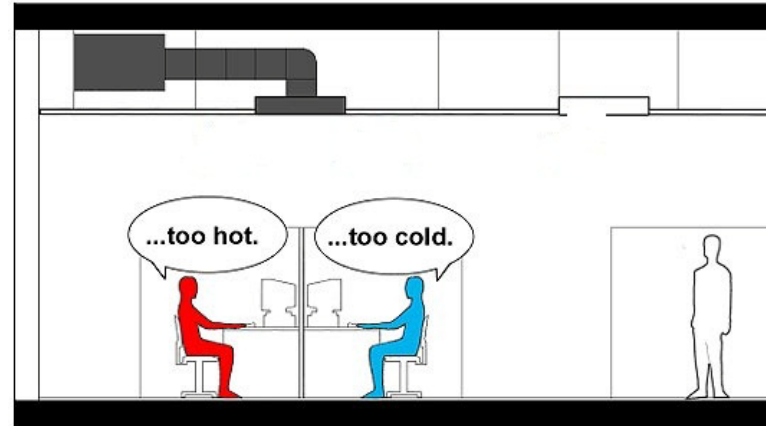


Fitness functions

Energy Saving



User thermal comfort



Minimisation of total building thermal energy

- Thermal energy consumption (kWh/m²)

Maximisation of user thermal comfort

- Metabolic rate (met)
- Clothing insulation (clo)
- Air temperature (°)
- Air speed (m/s)
- Mean radiant temperature (°)
- Relative humidity (%)

Simulation results

December 2013–February 2014

	Baseline	Optimized
SetPoint Supplied Water [° C]	65 (fixed)	Daily controlled
SetPoint Thermostats [° C]	21 (fixed)	Daily controlled
Season PPD [%]	6,1	8,9 (PPD max = 9,8 Within law rules)
Season Gas Consumption [m ³]	8419	7687
Saving [m ³]	–	732
Saving [%]	–	8,69

**Thank you for your
attention!**