REAL CORP 2019

Is this the Real World?
Perfect Smart Cities
vs.
Real Emotional Cities

A SMART HOME NETWORK FOR PROACTIVE USERS

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SUMMARY

Introduction

General framework

European SET Plan Challenge 1st: "Active consumer is at the centre of the energy system ".

I-MiSE ESRP: research and development of National Electricity System research programme guidelines as part of the "*Development of an integrated model of a replicable Urban Smart District network*" .
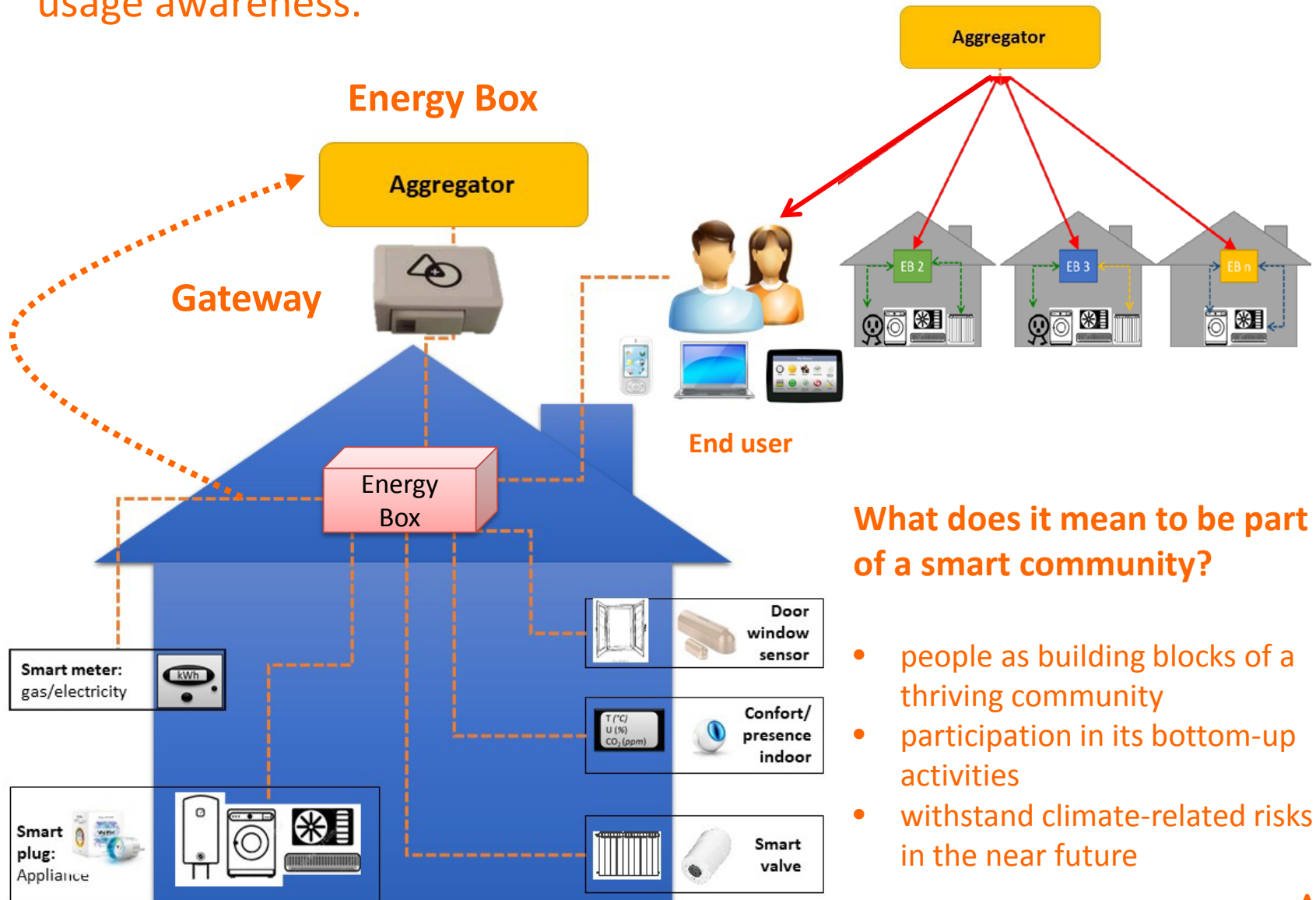
Project

SHN Centocelle: an experimental demonstration of a Smart Home network is being carried out in the Centocelle district of Rome, called "Smart Home Centocelle".

The project: a replicable Smart home Network

**Aim:** to reduce energy consumption by increasing users' energy usage awareness.

Energy Box

Gateway

Aggregator

Aggregator

End user

EB 2

EB 3

EB n

Energy Box

Smart meter: gas/electricity

kWh

Smart plug: Appliance

T (°C) U (%) CO₂(ppm)

Door window sensor

Confort/ presence indoor

Smart valve

What does it mean to be part of a smart community?

- people as building blocks of a thriving community
- participation in its bottom-up activities
- withstand climate-related risks in the near future

System architecture: 3 levels

Technological solutions

Requirements

Technological solutions

Cloud

Web socket
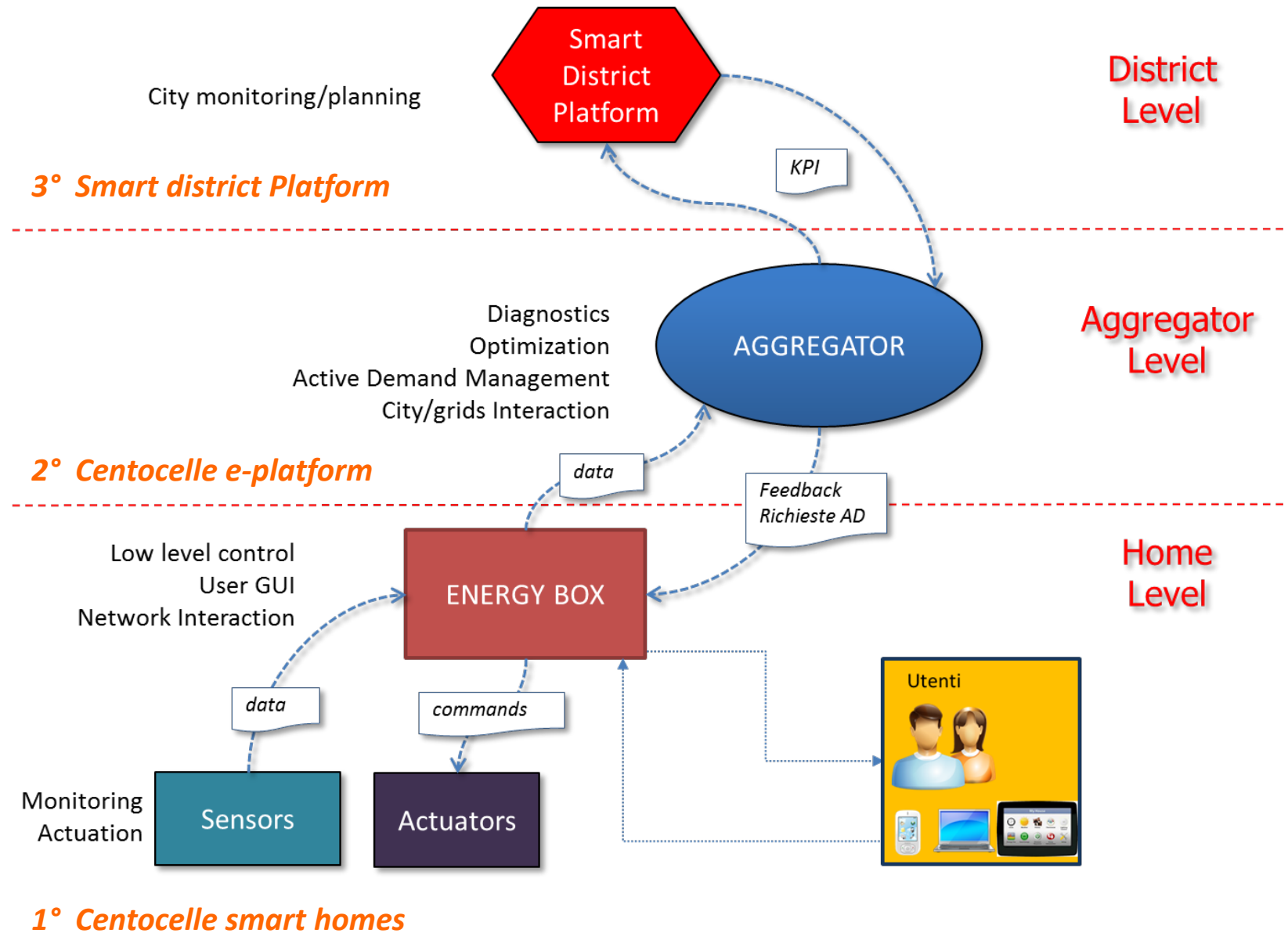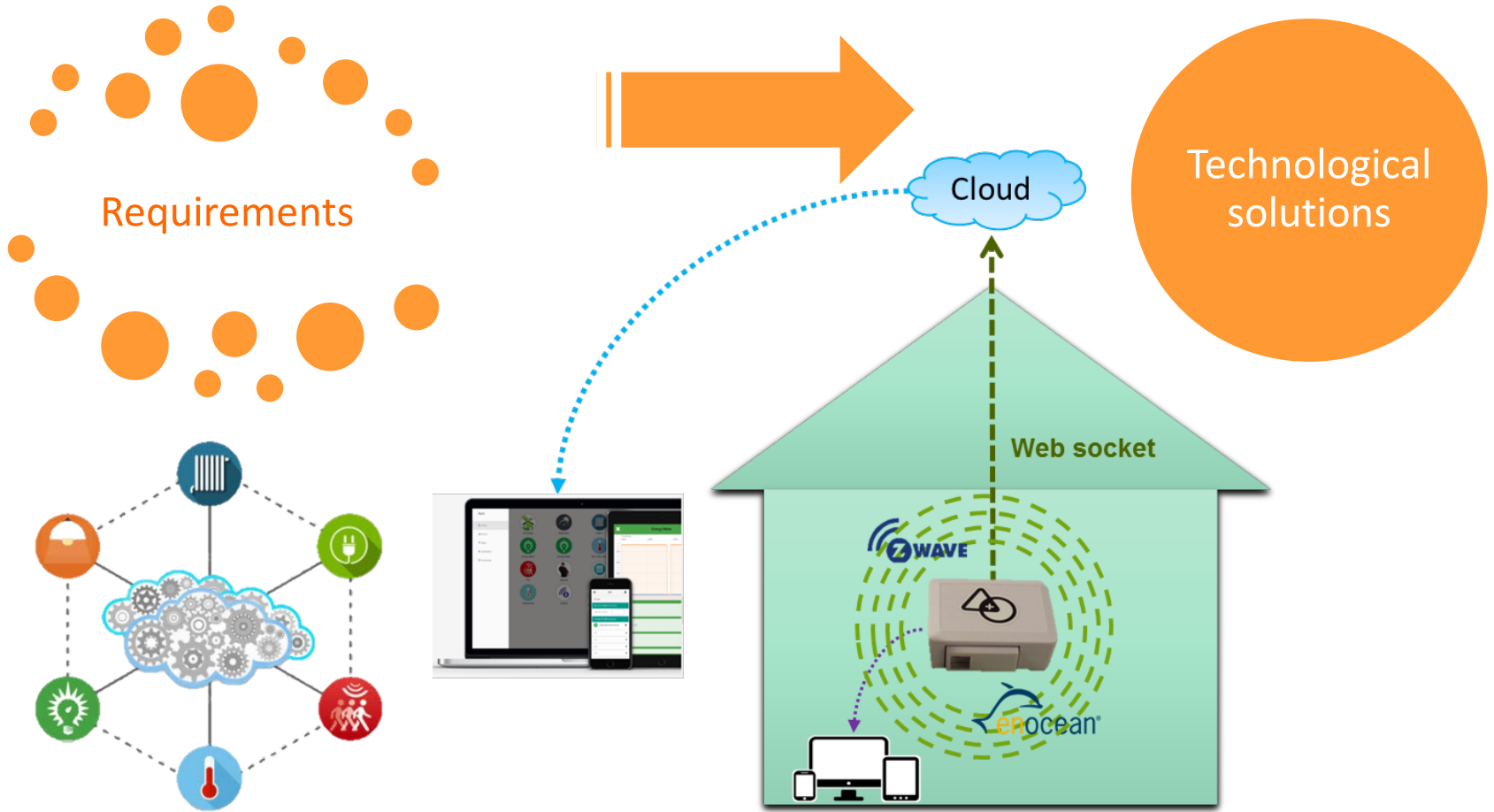
Z-WAVE

enOcean

- Interoperability
- Reliability
- Robustness
- Ease of use and interaction with the user

- Wireless sensors integration with standard and **open protocols** (Z-Wave, enOcean, …)
- Implementation of customised rules for home managment
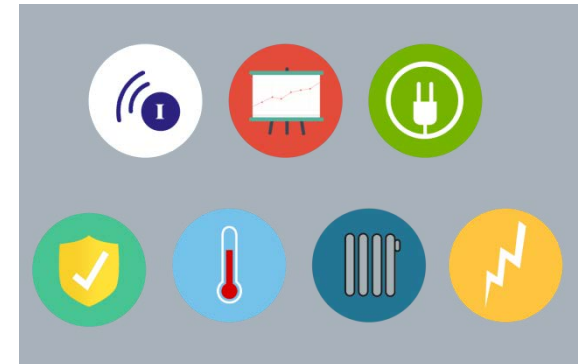- Services usable through Apps on both local and cloud platforms

Smart home toolkit

EBs' interface

Cloud Aggregator

Devices' interface control icons

Router with internet access

Users

Energy Box

Smart Meter:
- Elettricità

Remote control Apps

Smart valve

Sensore open/close

Heating on/off

Motion sensor

Smart Plug

Tmp
Luminosity
Presence
Accelerometer

Household appliances

Centocelle e-platform- Aggregator
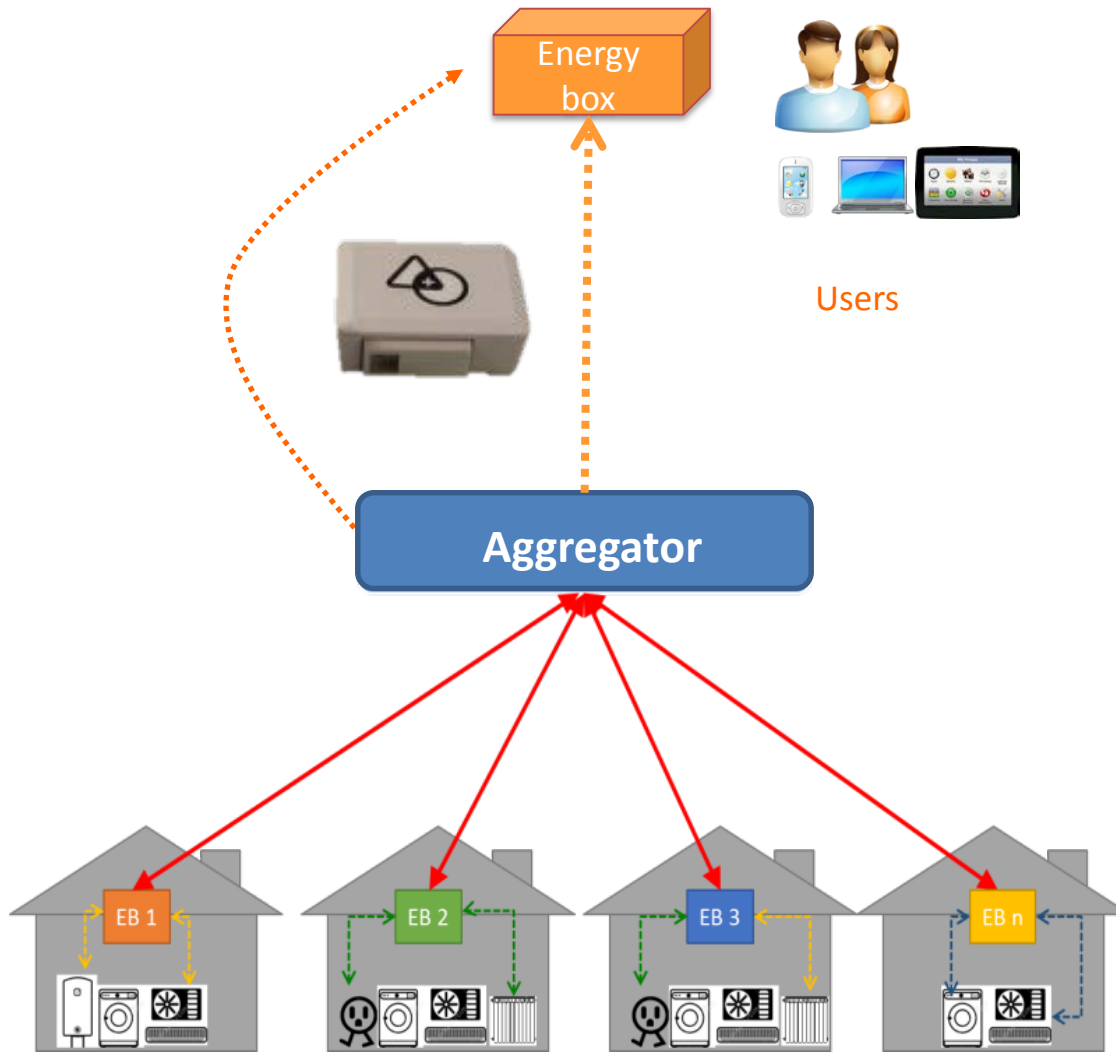
Raw data

- data set anonymously acquired
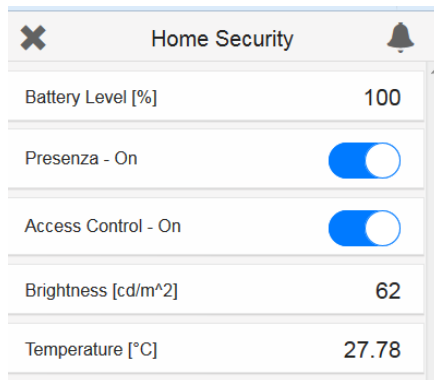- data mining used to define KPIs and only for statistical research purposes

Additional services

- processing KPIs
- district benchmarking
- competitive comparison
- interaction for demand response
- reports on consumption, potential pittfalls, anomalies, statistics
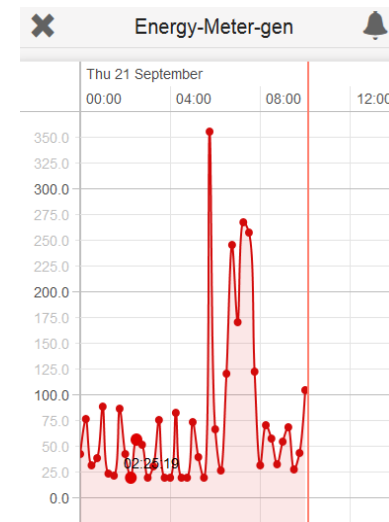
Energy box level
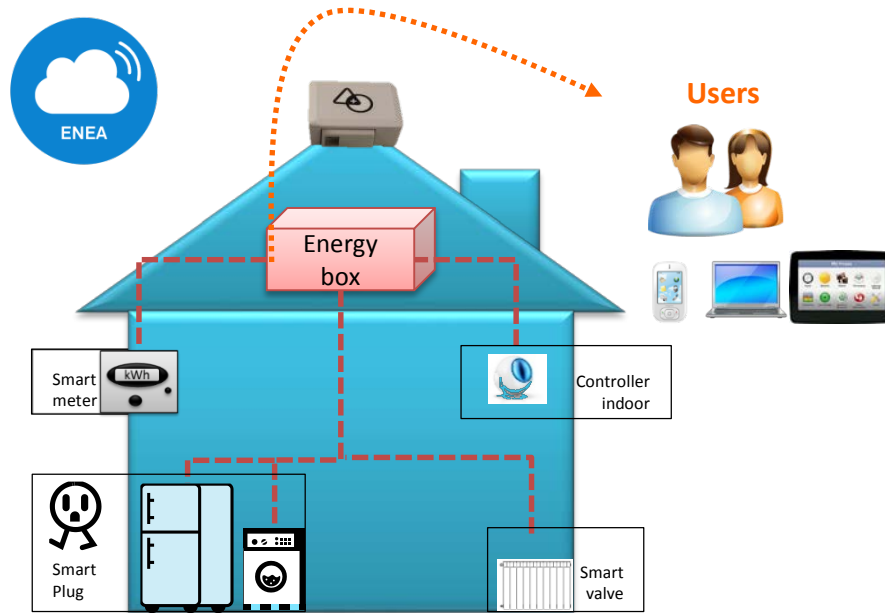
What the user can do:

- devices configuration and remote control
- real time monitoring
- check on consumption trends over time
- door opening / closing status check
- view alert (battery status, sensor failure)
- scheduling allows the creation of customised static configurations and user preferences (on-off / set point)
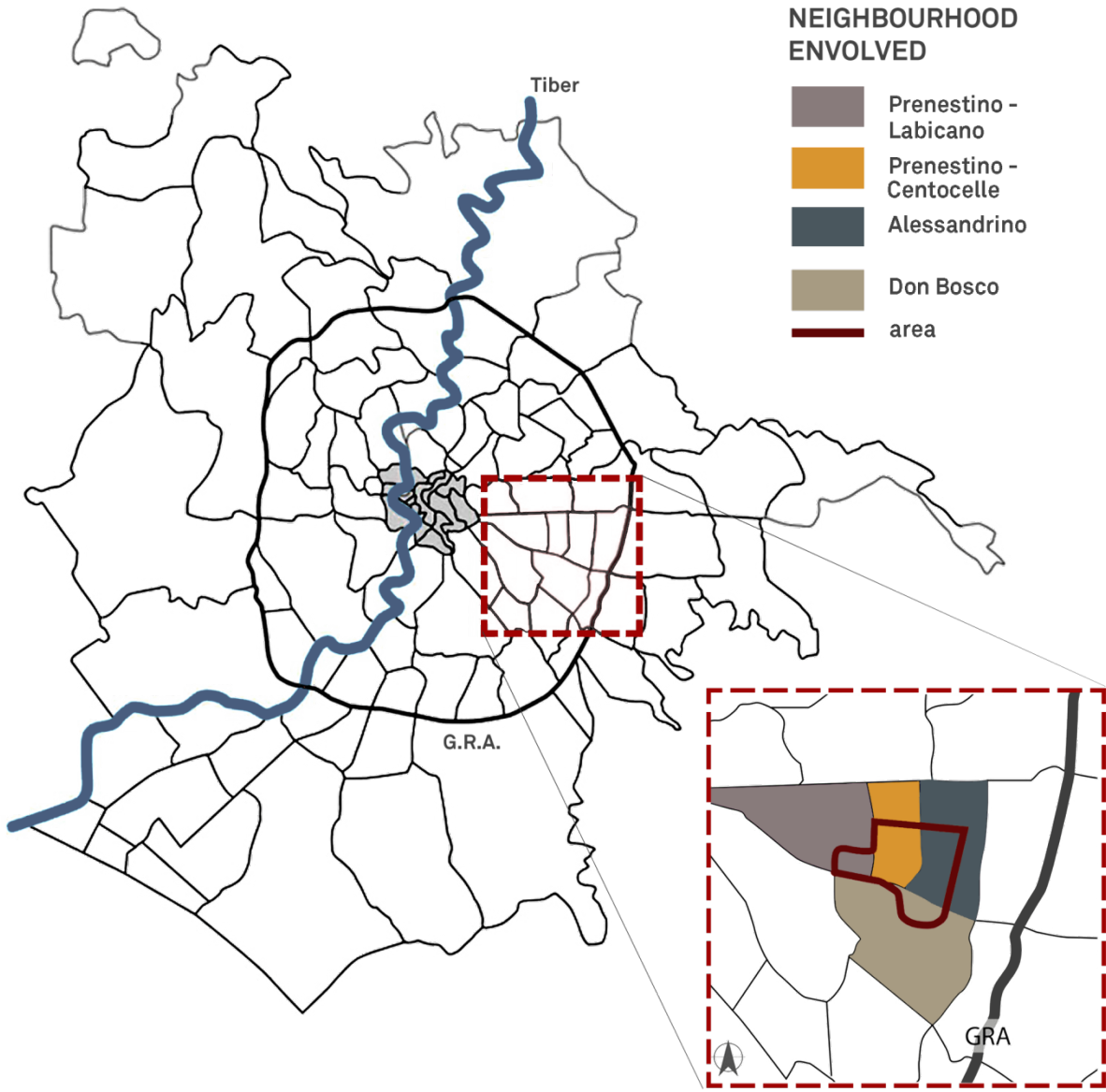

Home Security
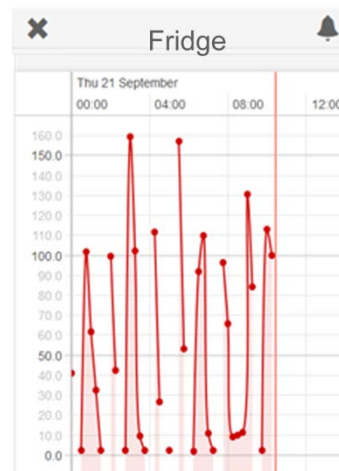
Smart Plug

Energy Meter

Centocelle neighbourhood

NEIGHBOURHOOD ENVOLVED

Prenestino - Labicano

Prenestino - Centocelle

Alessandrino

Don Bosco

area

Tiber

G.R.A.

GRA

Location

• South-east outskirts of Rome within the outer MW belt

• located between via Casilina on the South and via Prenestina on the North, not far from Rome's city centre

Features and qualities

• its core was designed and built during the 20s-30s

• today it is the result of the inclusion of a previous urban sprawl during the 60s -70s

Issues

• same background with likewise urban settings:

lack of public transportation convenience
enjoyable public spaces
low standard quality housing

Building typology and user profile

PICTURE	ID	BUILDING TYPE	m^2	YEAR OF CONSTRUCTION	N. OF FAMILY COMPONENTS
	C1	Flat in multi-family apartment block	49	1919-45	
	C2	Flat in a two-family house	101	1919-45	
	C3	Flat in multi-family apartment block	100	1962-71	
	C4	Flat in a two-family house	50	1946-61	
	C5	Flat in multi-family apartment block	100	1946-61	
	C6	Detached house	65	2010-15	
	C7	Flat in multi-family apartment block	65	1991-05	
	C8	Flat in multi-family apartment block	60	1962-71	
	C9	Flat in multi-family apartment block	95	1946-61	
	C10	Flat in multi-family apartment block	102	1962-71	
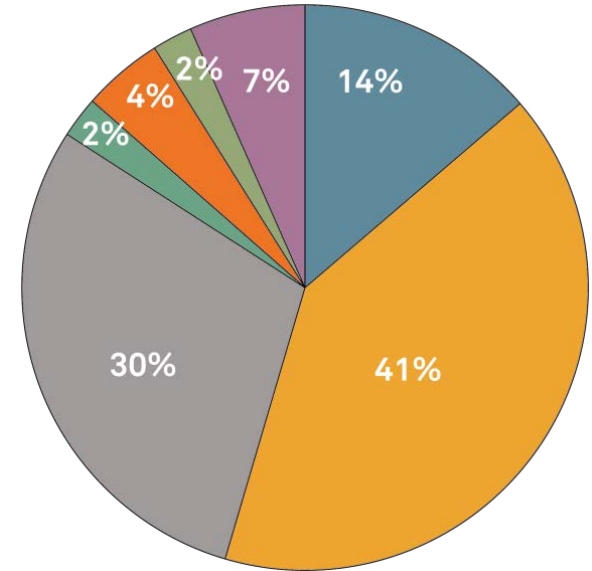
User typology

Commuters   41%
School students   30%
Part-time workers   14%
Housewives   7%
Job hunting   4%
Retired workers   2%
University students   2%

Phases of experimentation

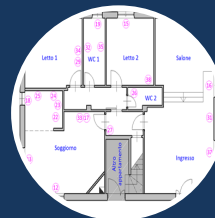| 1° Meet up	2° Audit	3° ToolKits	4° Experiment start	5° Experiment end
Being part of the project - fill in the application form	Housing audit - sharing installation configuration	Sensor kits delivery and installation	Implementation - Experimentation phase	Check
Sett-Ott 2017	Nov-2017 Feb 2018	Mar-Apr 2017	Mag-Giu 2018	Dic 2018
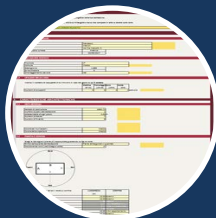
Survey

The People and their engagement

- Meet Up & Lectures
- Energy survey
- Events

ENEA SMART HOME event flyer

Self made Energy Audit

Aim: to verify how much the user was aware of his own energy consumption

Data collection module for the dometic consumption simulation, in dynamic calculation.

1) General information and usage profile
2) Building construction features
3) House plant and orientation
4) Appliances and other electrical equipment
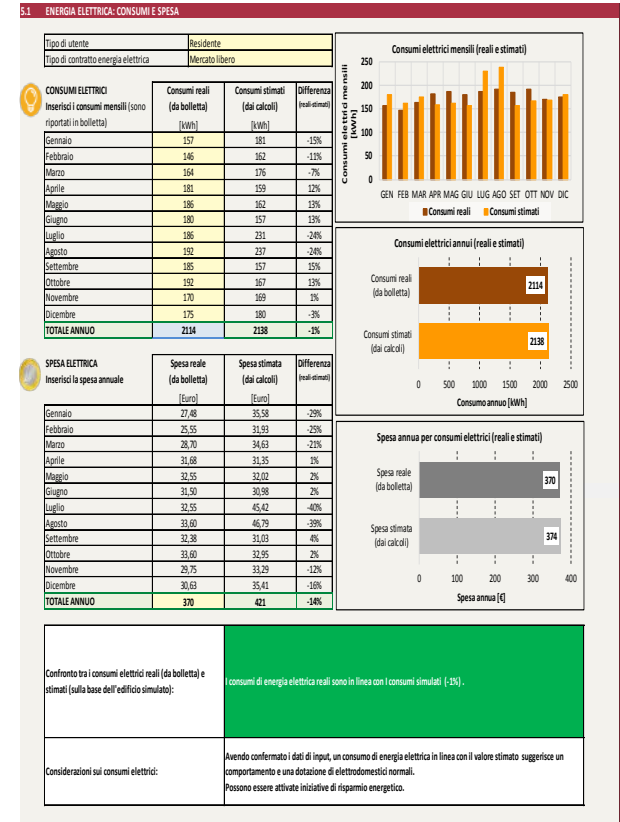5) Energy bills

Energy consumption

Heating   35%
Domestic hot water 18%
Lighting   3%
Cooling   2%
Other uses 42%
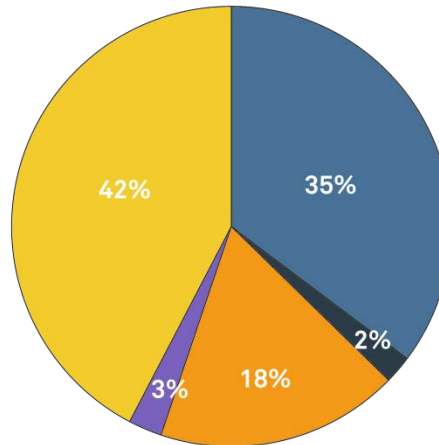
FEEDBACK

- Comparison between real / estimated energy consumption
- Indications on savings as per variation of electricity and gas supply contract
- Simulation of energy and economic savings after automation systems installed

Feedback:

Feedback

Evaluation of the experimentation impact

WITH SOCIOLOGISTS AND PSYCHOLOGISTS

Word cloud representative of the recursion of the most frequently used words in the answers given by the interlocutors

Liking of the installed technology

ENERGY SAVING

8% average

REQUEST FOR ADDITIONAL CUSTOMIZED SERVICES
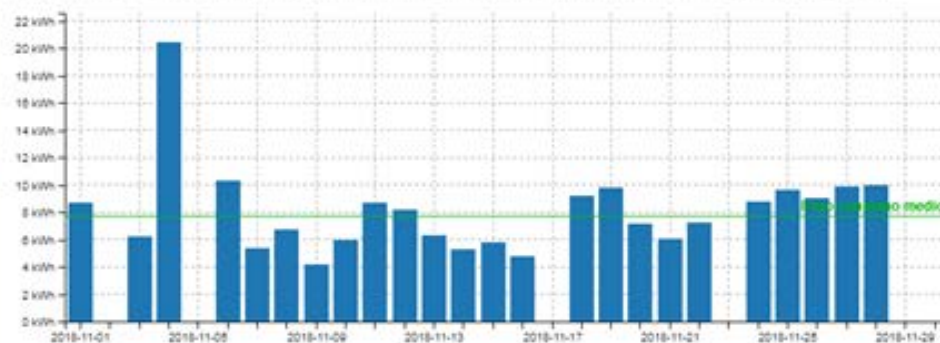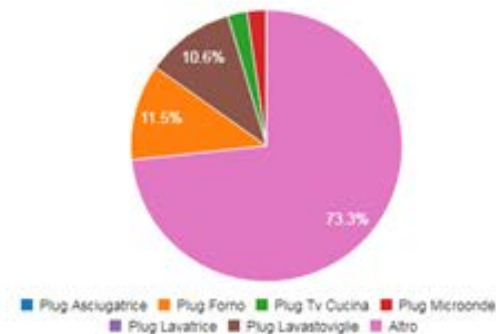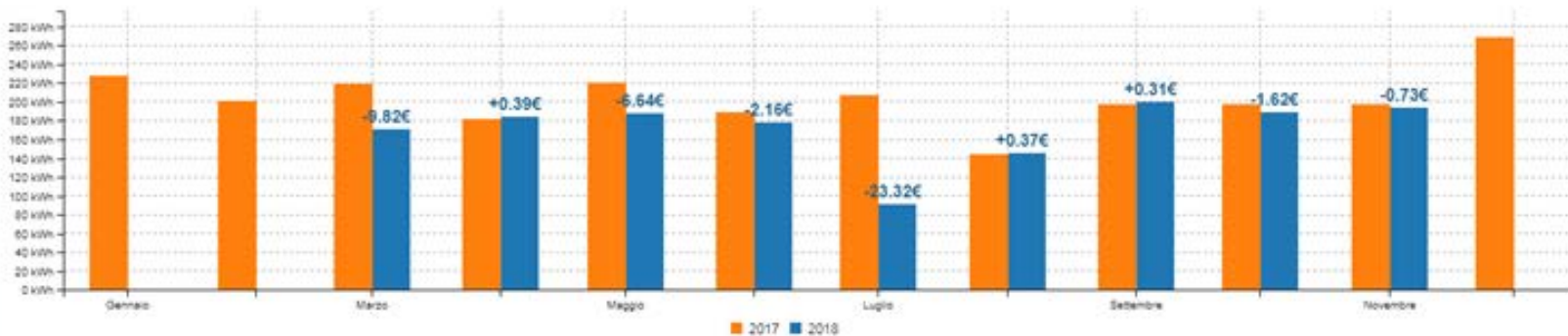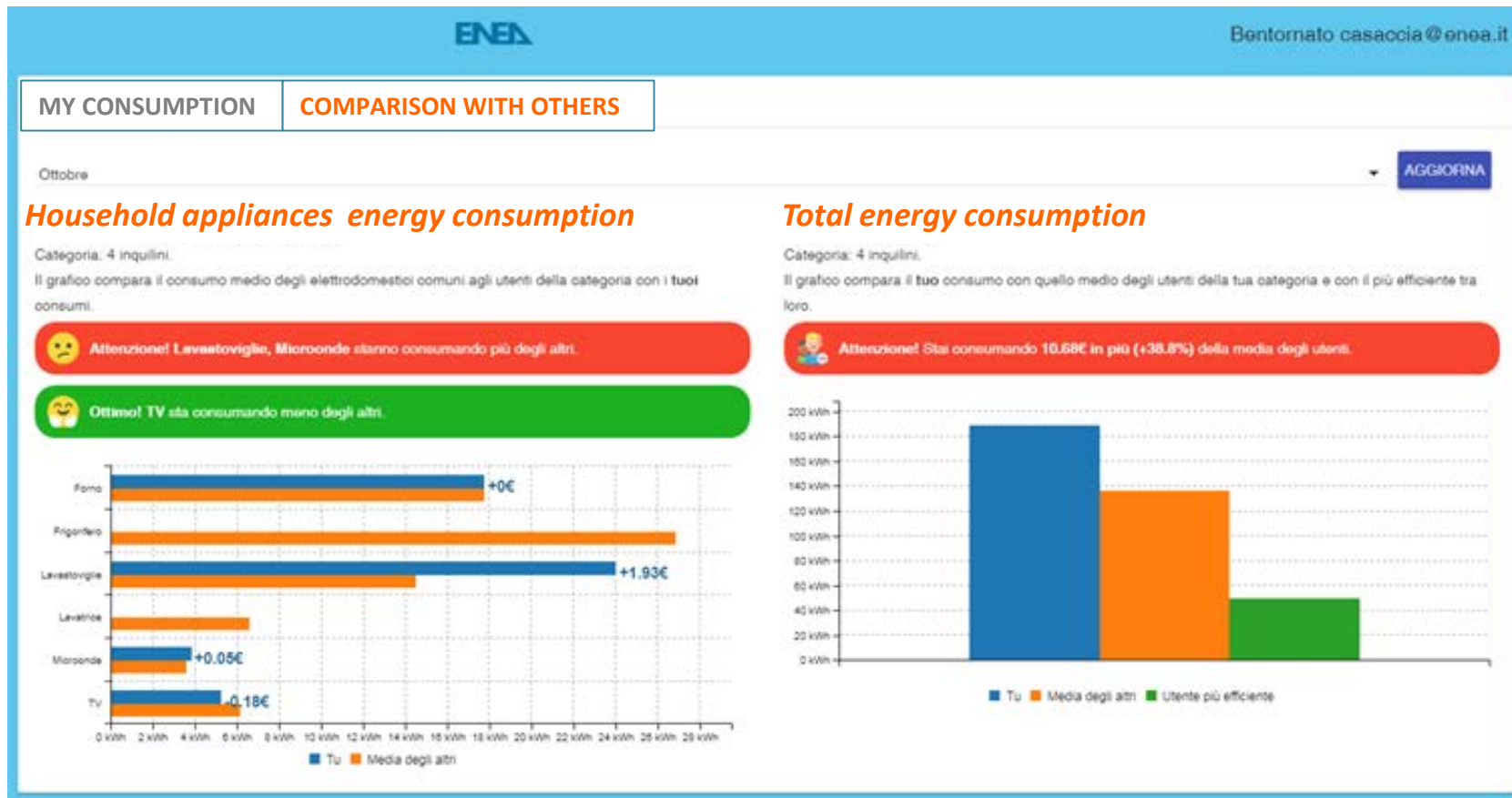
Additional services

|		
SECURITY		The service provides, in the absence of users, the detection of the intrusion of strangers in the home or the break-in of the locking systems.
SAFETY		Thanks to the sensors for monitoring particular environmental parameters the system is able to prevent injuries and potential pitfalls.
ASSISTED LIVING		A series of services aimed at helping vulnerable and fragile people to live better and longer in their own homes for as long as possible.

Conclusion

THE SMART HOME MODEL STRENGHT :

To help users live better and longer at home

New services

FOR ALL:

Energy consumption
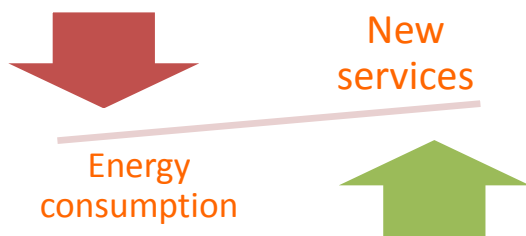
Integration between solutions to sort out both social and energy control issues

THE NEXT STEP

LOCAL ENERGY COMMUNITY

http://centoce.it/

THANK YOU FOR YOUR ATTENTION!

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