SESSION 3: TECHNICAL AND LEGAL CHALLENGES

ICT-ENABLED BEHAVIORAL CHANGE TOWARDS ENERGY EFFICIENT LIFESTYLES (INBETWEEN)
PROJECT TECHNICAL COORDINATOR - DR MARKO BATIC, INSTITUTE MIHAJLO PUPIN

Session 3: Technical and legal challenges
Topics covered

- Monitoring Technology Implementation

- Data Quality

- Personal Data Protection

- System Interoperability

- Data Analysis

- Application And Gamification Development Issues

Monitoring Technology Implementation

Ambient sensing & energy management

- **Sensor measurements**

Electricity (EMI)

Heat meters

Motion, Light, Temperature

Air quality (VOC)

- **Control of actuators**

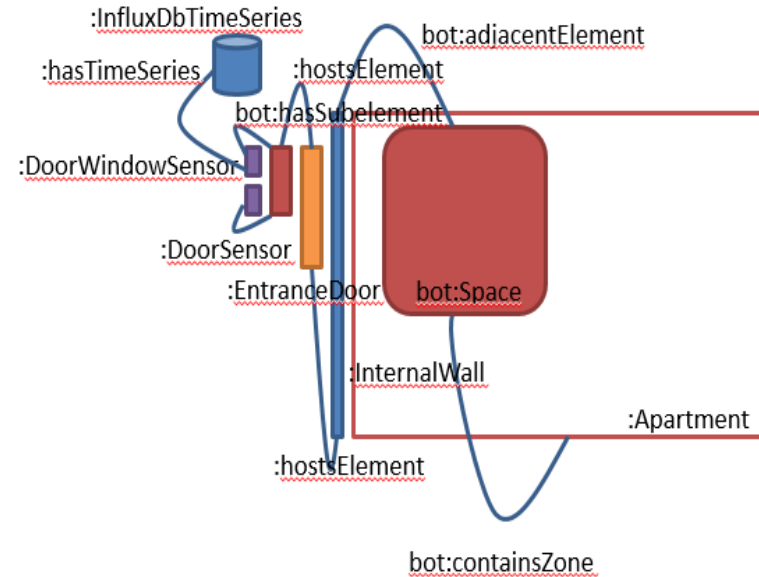Smart plugs/cables (ON/OFF)

Smart thermostats (set-point)

Smart Thermostat

Smart plug & cable

Smart Meter interface

Motion, light & temperature sensor

Gateway

Air quality sensor

Door & window sensor

Monitoring Technology Implementation

Technical challenges

- Data quality

Outliers, on-change data (online status), missing data (internet, battery), EMI (LED rate), repeaters (smart plugs)

- Personal data protection & Data analysis

Anonymized data for Data Controller/Processor

- System interoperability

CDM, Ontology based knowledge repository
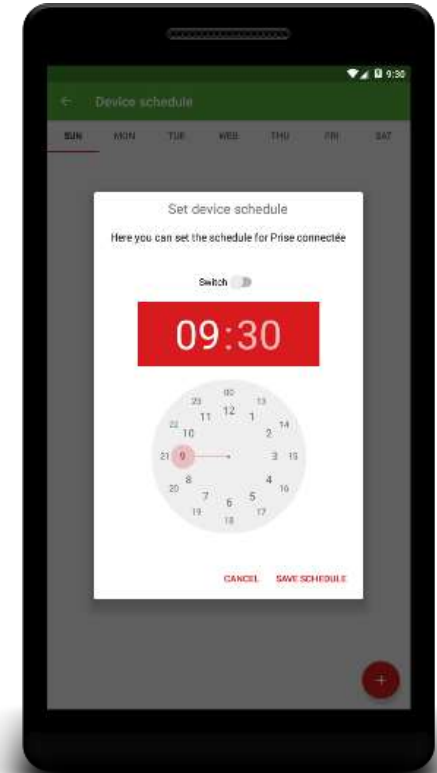
InBetween energy services

Advanced energy services

- **Consumption analytics**

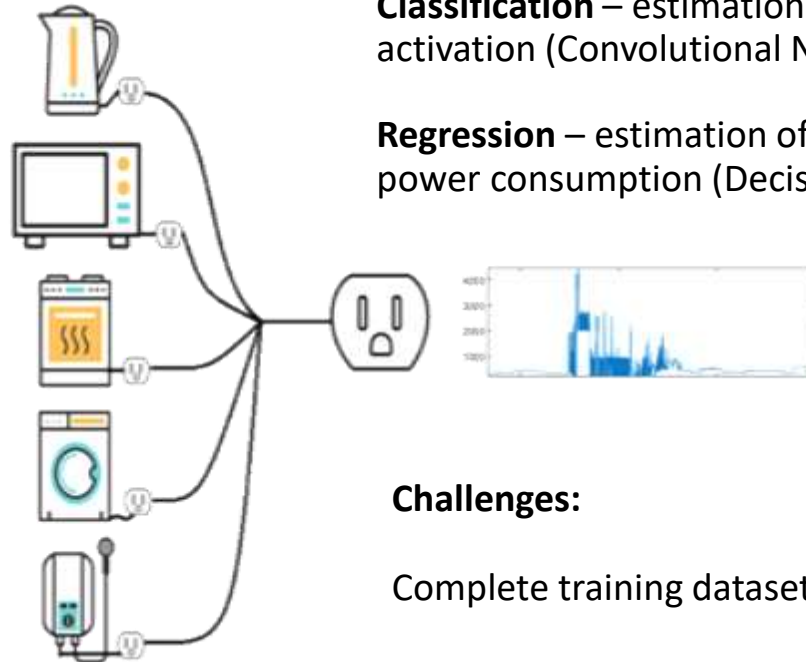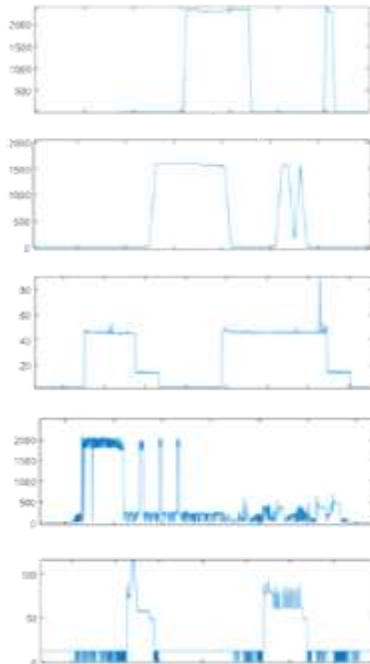Non-Intrusive Load Monitoring

- **Demand optimization & scheduling**

Weekly schedules, unlimited intervals

Day-ahead schedule optimization

Consumption analytics methodology

Non-Intrusive Load Monitoring (NILM)

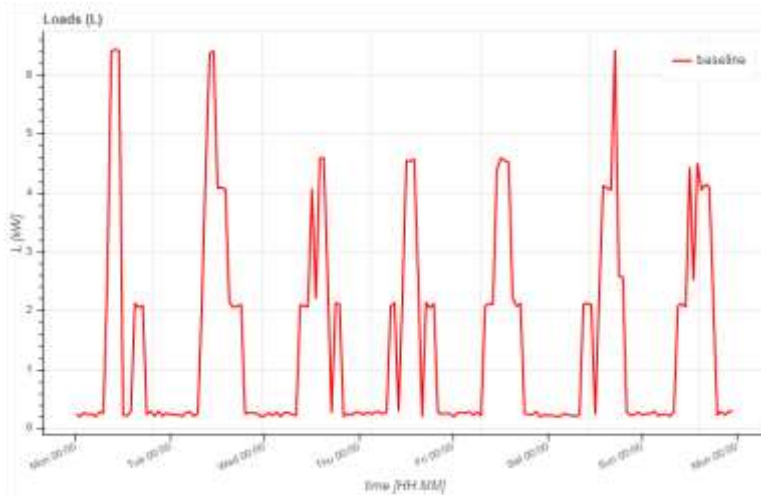**Classification** – estimation of appliance's activation (Convolutional Neural Networks)

Regression – estimation of the appliance's power consumption (Decision Trees)

Challenges:
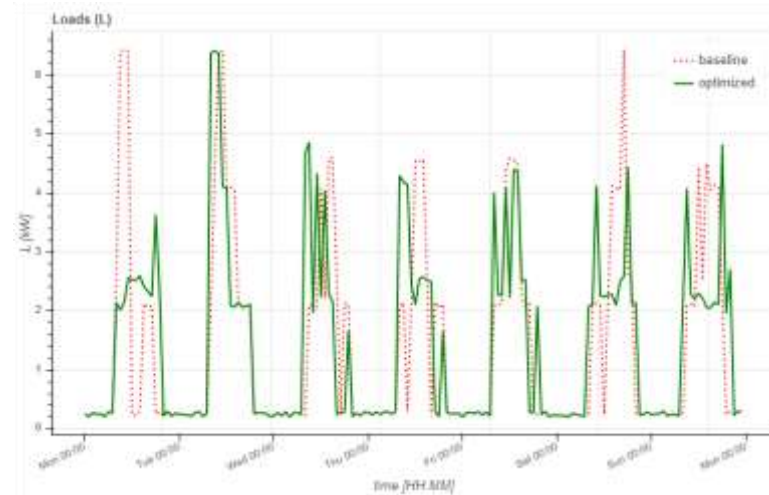
Complete training dataset, labelled data

Appliance scheduling methodology

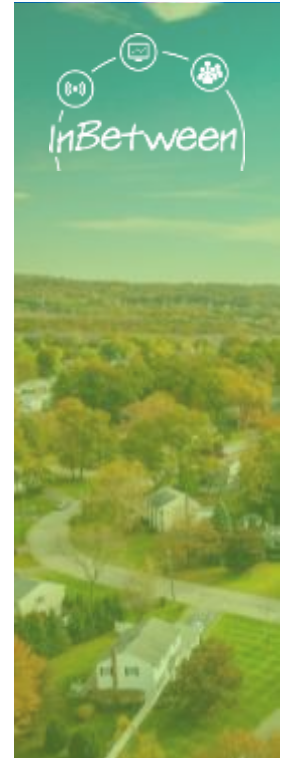Baseline (as **scheduled by user**)

Optimized loads (as **suggested to the user**)

Formulated as a **mixed integer linear programming** (MILP) problem

Challenge: Provide actionable output (not optimal profile!)

InBetween energy services

Real-time notification centre

- **Real-time notifications & actions**

Energy Conservation Measures (ECM)
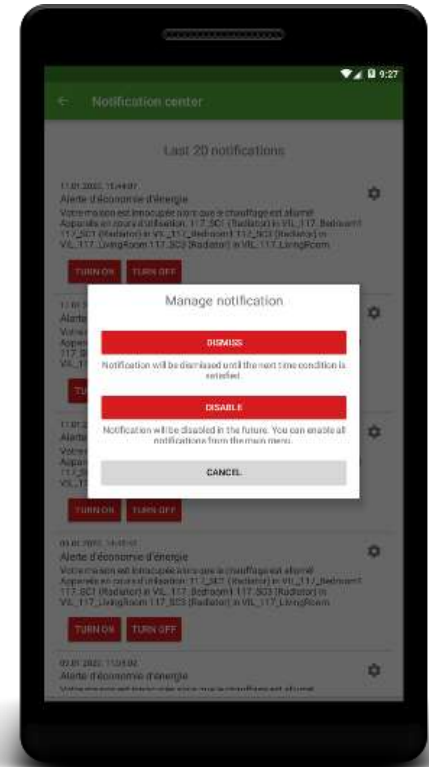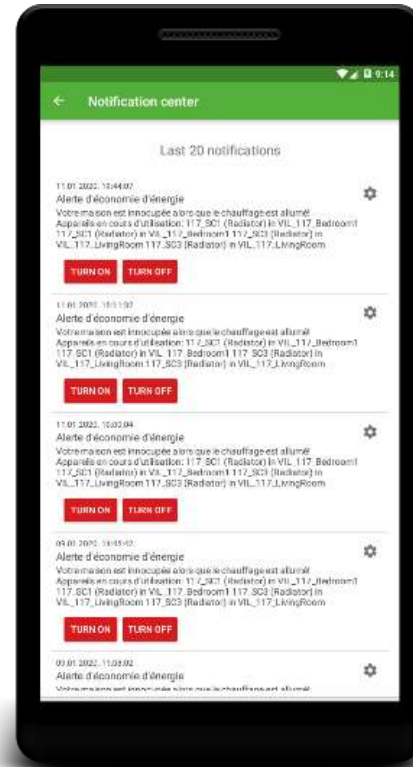
Health issues

Security issues

- **Context related & customizable**
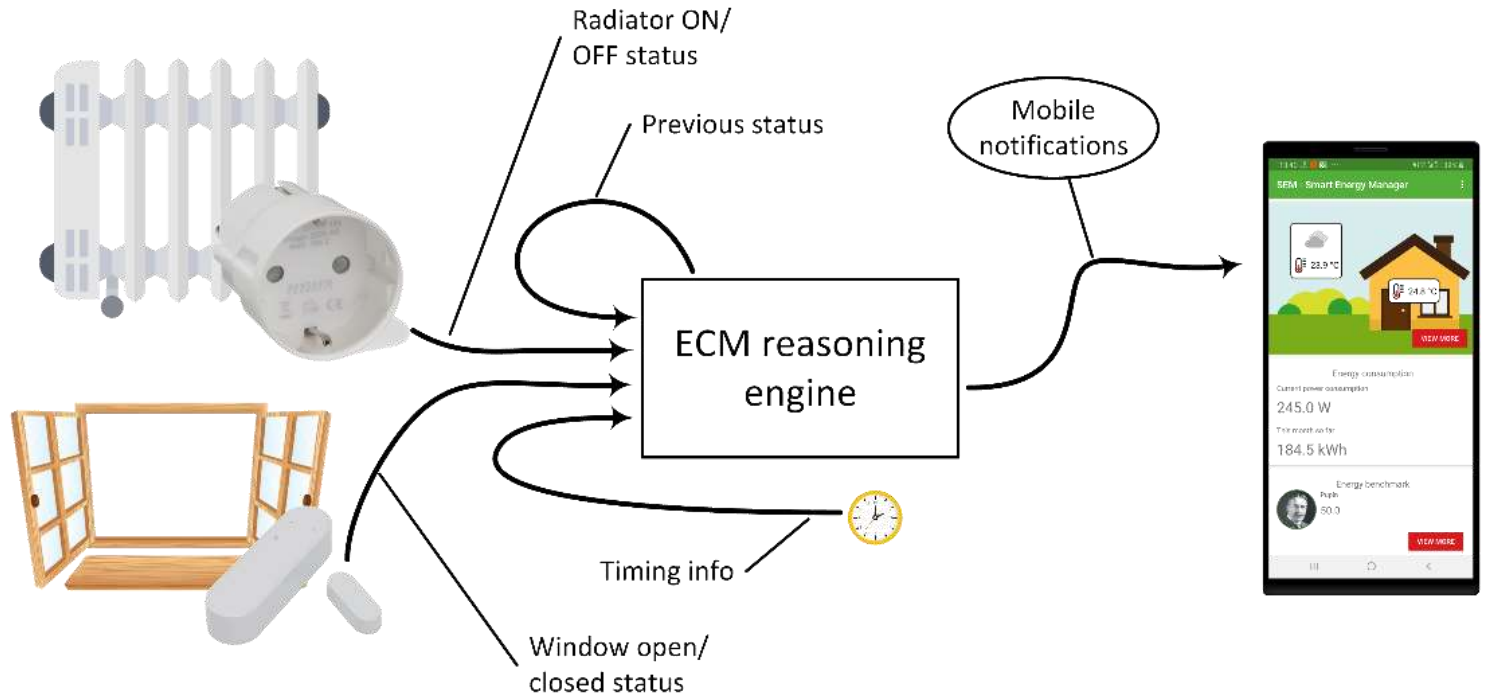
Based on static building information

and real-time measurements

Dismiss and disable option

Real-time notification service

InBetween Mobile App
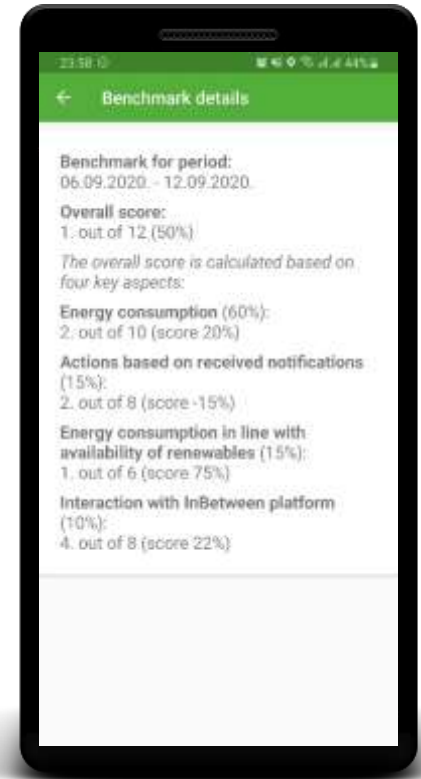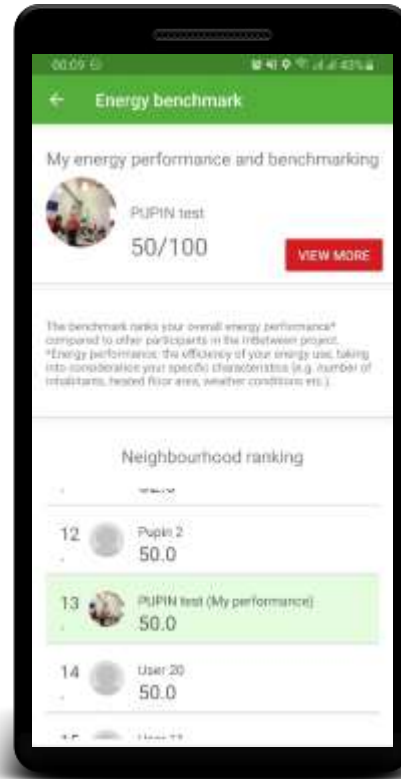
EE performance & benchmarking

- **My energy performance**

Normalized energy consumption
(consumption, weather, occupancy,
etc.)

- **Benchmarking with neighbors**

Daily performance evaluation

Scoring & ranking

InBetween Mobile App

Summary report

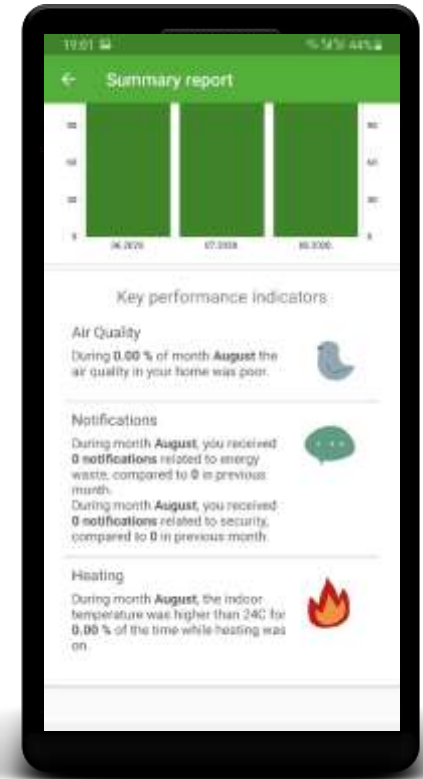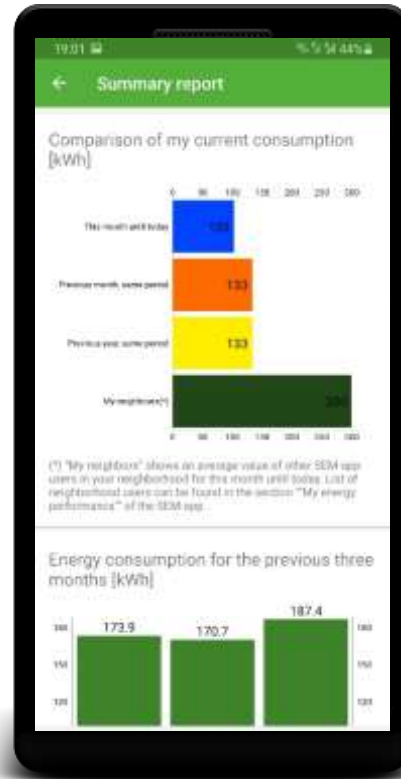- **Consumption comparison**

Current, previous month, previous year, neighbors

- **Key Performance Indicators**

Air Quality

Notifications

Heating

THANK YOU FOR YOUR KIND ATTENTION!

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