European Union's Horizon 2020 research and innovation programme

enCOMPASS - an Integrative Approach to Behavioural Change for Energy Saving

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Agenda

- Motivation
- enCOMPASS Project
- Technical Approach
- Architecture
- Pilots
- Evaluation
- Current and Future Work

Motivation

Europe Energy Targets for 2030:

- 40% cut in greenhouse gas emissions (CO2) compared to 1990 levels.
- 27% energy savings compared with the business-as-usual scenario.
- 27% share of renewable energy consumption.

Strategy

- Structural policy measures:
  - Reformed EU emissions trading scheme (ETS)
  - New indicators for the competitiveness and security of the energy system.
  - Subsidising energy efficient building renovation
- Technological progresses (e.g. smart meters, smart home technology)

Motivation

Integrate technological solutions to:

- Enable behavioral change towards energy efficiency attitudes.
- Educate, motivate and rise awareness on energy users about their consumption habits.
- Trigger energy saving attitudes by providing timely and context-based information to save energy.
- Reach energy saving without sacrificing user's comfort levels.

enCOMPASS Project

- Is an integrated **socio-technical** system for **energy saving** and **behavioural change**, that integrates **IoT technologies** to collect information about the context where users and their activities, and combines it with **persuasive technologies** to encourage energy saving attitudes and long-term behavioural change through timely **personalized suggestions** and suitable **motivational techniques**.

- Project funded by the EU H2020 Programme

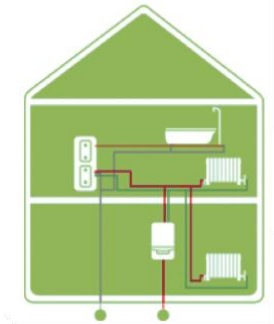
enCOMPASS Objectives

- Stimulate behavioural change for energy saving using innovative digital tools
- Make energy usage data accessible to consumers in a user-friendly and easy to understand way
- Demonstrate that individual comfort levels can be maintained while achieving energy saving
- Validate the effectiveness of different types of behavioural change interventions for different types of users in different of climatic conditions
- Make the enCOMPASS platform and other digital tools available to third parties to start new services for smart energy demand management

Technical Approach

Intelligent controls and automation for sustainable changes in user energy consumption

Intelligent control



Energy saving!!!

Architect

Engagement engine
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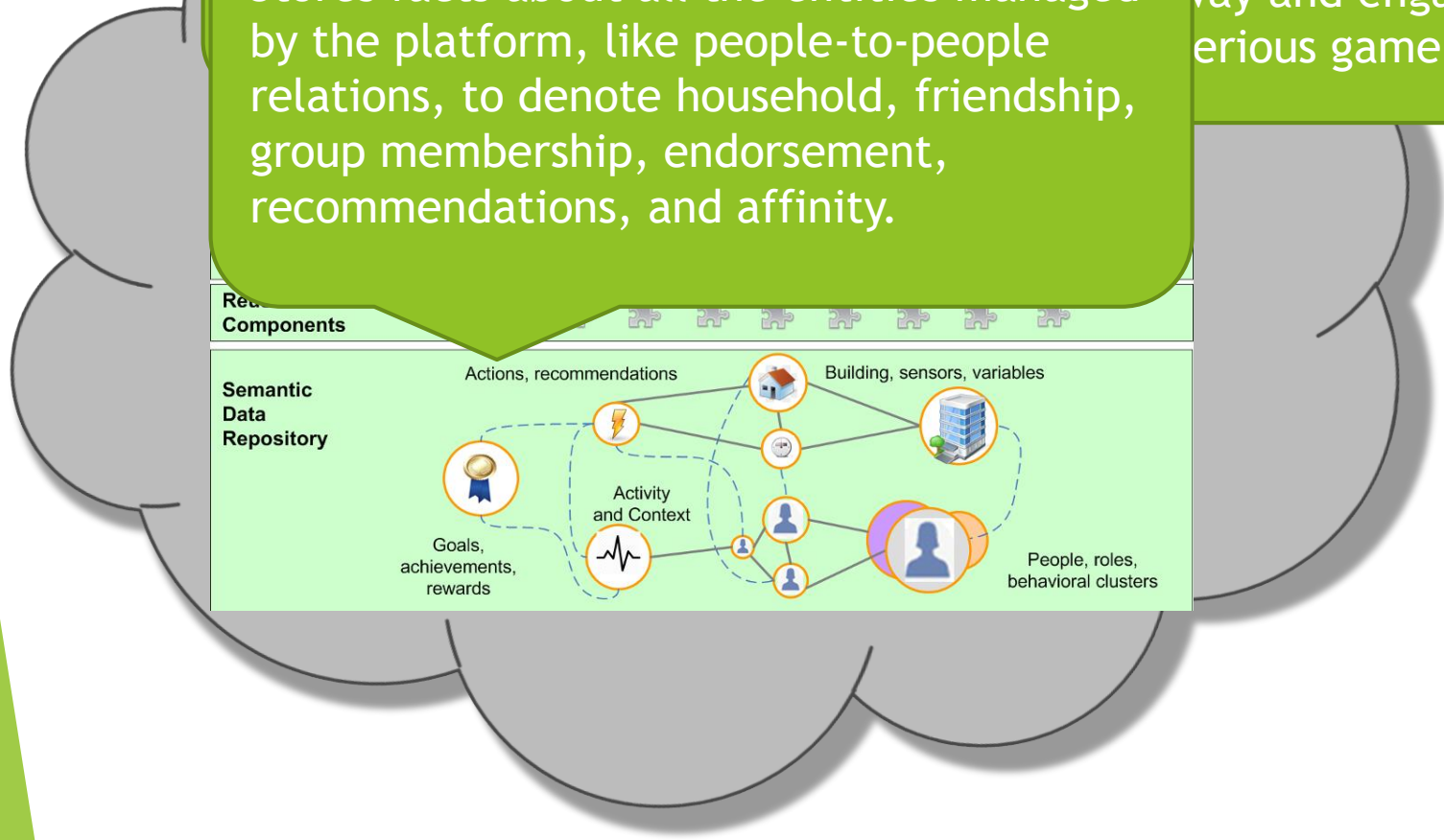
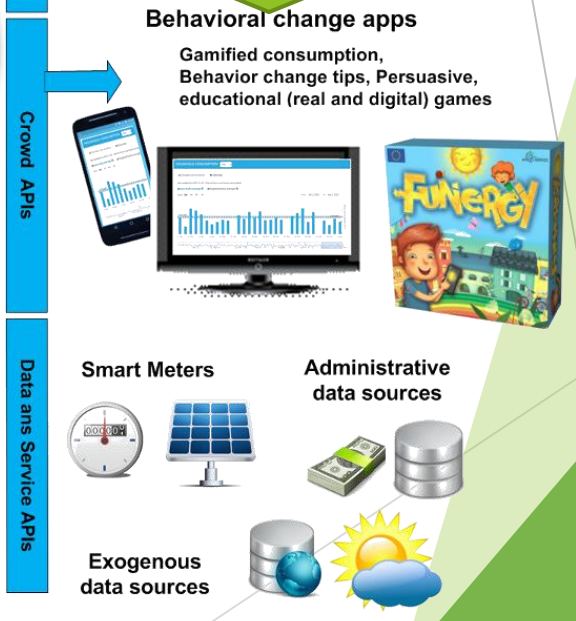
apps:
Web and Mob applications to
isualize energy usage in playful
vay and engage user into the
erious game mechanics.

enCOMPASS APIs:
Prodiving on-demand, cloud-based web services enabling access to the platform data and services.

Semantic data repository (SDR):
Stores facts about all the entities managed by the platform, like people-to-people relations, to denote household, friendship, group membership, endorsement, recommendations, and affinity.





Pilots for Validation

- 3 pilots in different climate zones, with different cultural setting and on different building types, in collaboration with local utility companies.

Germany	Switzerland	Greece
Stadtwerk Haßfurt	Società Elettrica Sopracenerina (SES)	WATT+VOLT S.A. (WTV)

Buildings and Actors

- 3 building types:

Residential buildings	Schools	Office and Public buildings
Residents (Families)	School students (primary school and college) and staff	Office personal, public administration employees and visitors

Evaluation

Residential buildings:

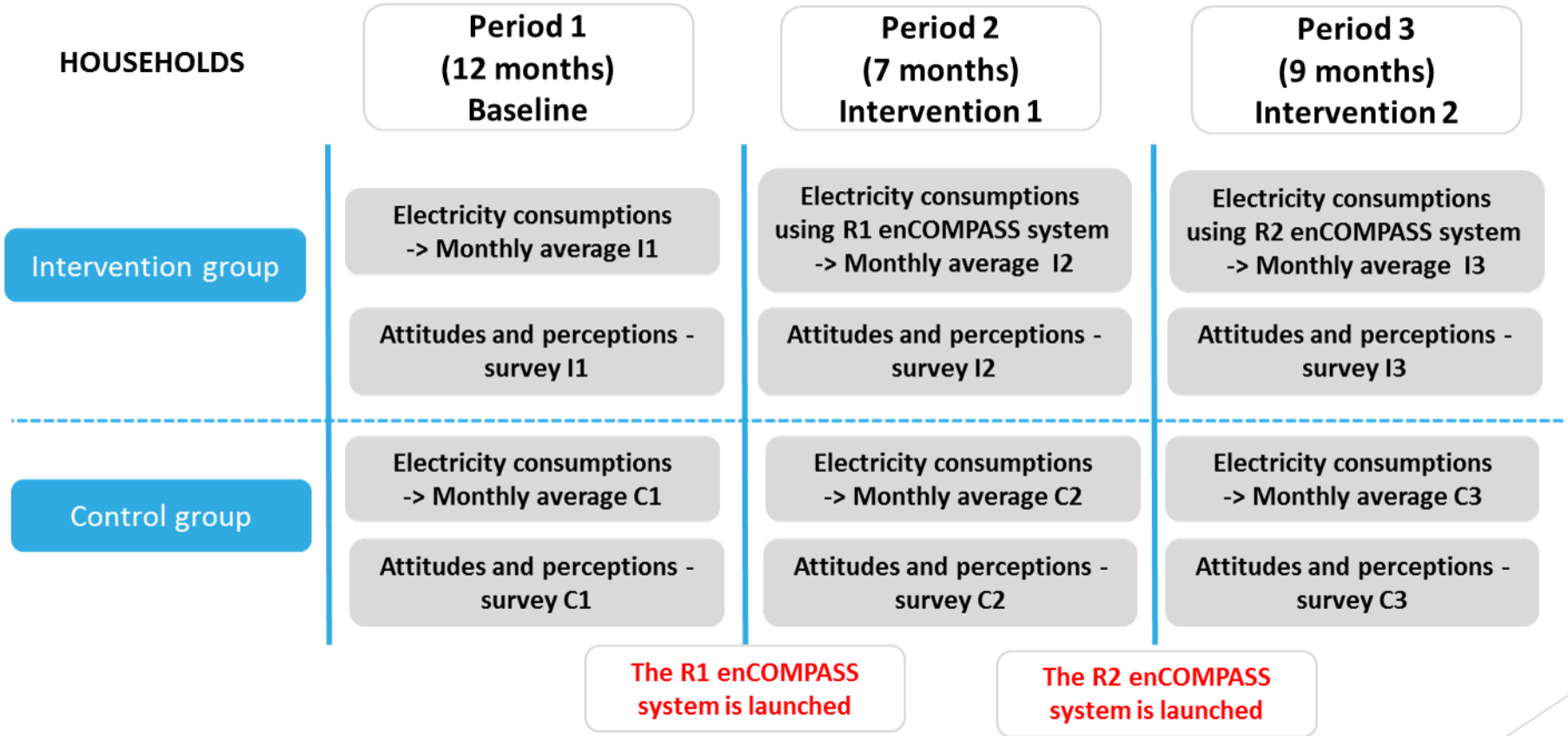
- 2 Sample groups on each pilot: Intervention and Control group, 100 households each.
- Intervention group will be stratified by:
  - Size: single-person, couple, more than two person households;
  - Type of house: single-family house, apartment;
  - Type of heating: electricity-fed, oil, gas, wood, other
  - Type of hot water boiler: electricity-fed, oil, gas, wood, other
- Control group households will be randomly selected, adopting the same proportions as the related Intervention group, and It will be totally uninfluenced by the enCOMPASS platform.

Evaluation

Schools and Public Buildings

- Intervention Size is limited, no Control group will be available
- The eeMeasure methodology will be applied, using regression models to estimate the projected energy consumption after the intervention

Evaluation


HOUSEHOLDS
Period 1 (12 months) Baseline
Period 2 (7 months) Intervention 1
Period 3 (9 months) Intervention 2
Intervention group
Electricity consumptions -> Monthly average I1
Electricity consumptions using R1 enCOMPASS system -> Monthly average I2
Electricity consumptions using R2 enCOMPASS system -> Monthly average I3
Attitudes and perceptions - survey I1
Attitudes and perceptions - survey I2
Attitudes and perceptions - survey I3
Control group
Electricity consumptions -> Monthly average C1
Electricity consumptions -> Monthly average C2
Electricity consumptions -> Monthly average C3
Attitudes and perceptions - survey C1
Attitudes and perceptions - survey C2
Attitudes and perceptions - survey C3
The R1 enCOMPASS system is launched
The R2 enCOMPASS system is launched

Ongoing Work

- Architecture is currently being implemented
- Household recruitment is ongoing
- Historical consumption data is been collected for baseline calculation
- Sensor detailed specification has been produced
- The smart home apps of the utilities are being completed
- First release of the enCOMPASS platform is planned for November 2017

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IEEE Access Special Section on Social Computing for Smart Cities

- Submission deadline 30 November 2017
- The topics of interest include, but are not limited to:
  - Social Media Analytics and Intelligent Social Media
  - Social Behavior Modeling
  - Sentiment Analysis , Opinion Representation, and Influence Process Modeling
  - Methods for motivating contribution and participation in social computing systems
  - Middleware for developing social computing applications
  - Privacy mechanisms related to social computing data and systems
  - Design and evaluation of behavioural change support systems for sustainability
  - Recommender systems and social matchmaking systems for mobility and resource consumption
  - Crowdsourcing, collaborative content creation and social collaboration tools
  - Social gaming and gamified interactions
  - Modeling, analysis and knowledge extraction of users social interactions in mobile and pervasive social networks
  - Experimental platforms and testbeds for social interaction in smart cities

Consortium

POLITECNICO DI MILANO

NABU

kaunas university of technology

Information Technologies Institute

SET MOBILE

stadtwerk haßfurt

EIPCM
EUROPEAN INSTITUTE FOR PARTICIPATORY MEDIA

Scuola universitaria professionale della Svizzera italiana
SUPSI

PARADOX ENGINEERING
UNLOCKING THE VALUE OF YOUR DATA

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Research & Development

WATT+VOLT

SES
Società Elettrica Sopracenerina

KALEIDOS GAMES

Thank you!

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Questions?