

# ENTROPY

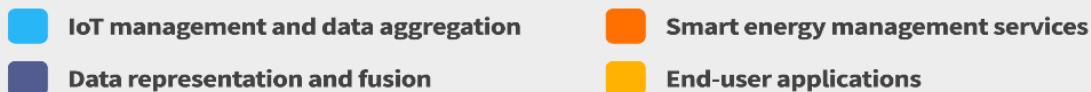
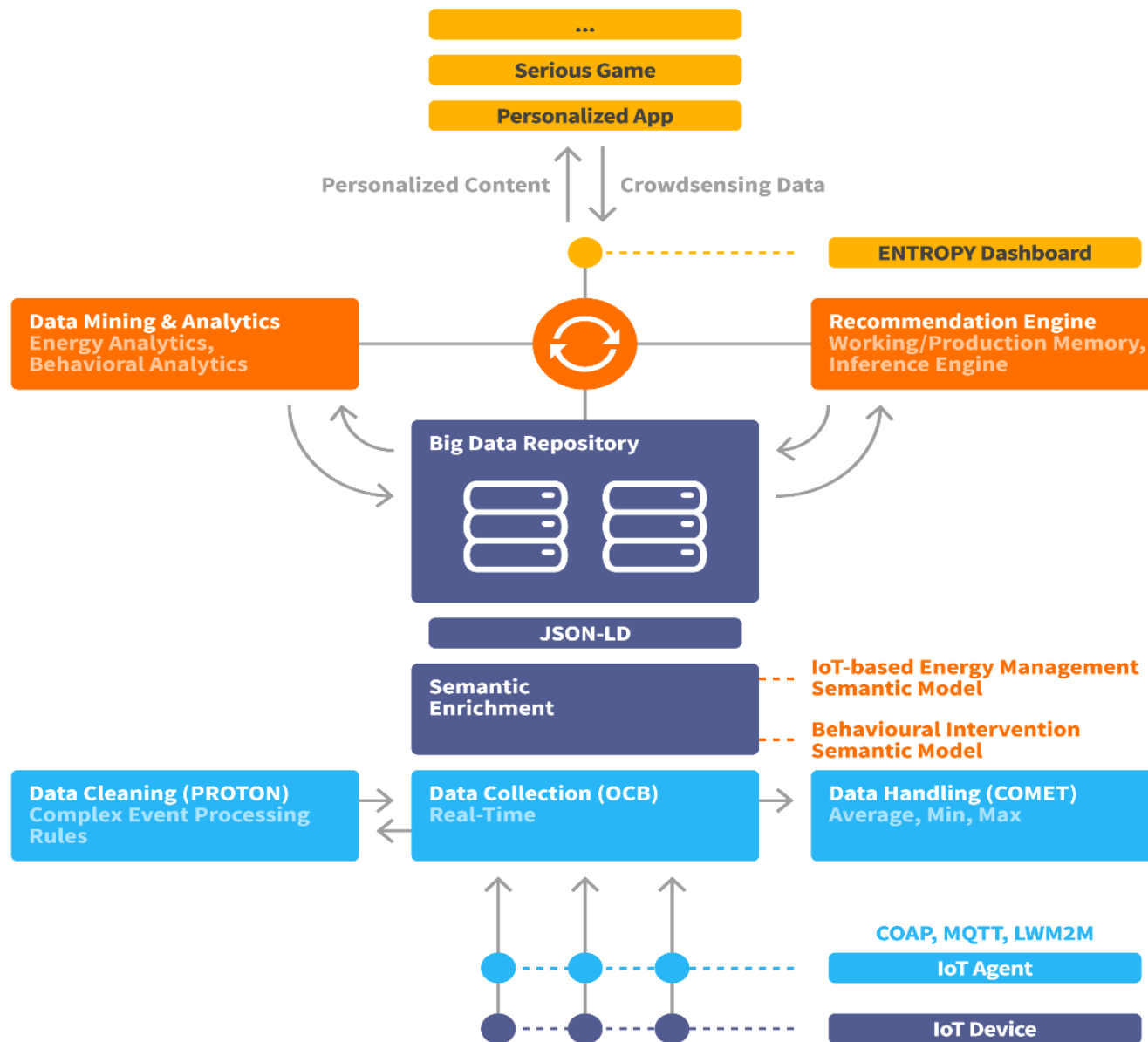
## Design of an Innovative Energy-Aware IT Ecosystem for Motivating Behavioural Changes Towards the Adoption of Energy Efficient Lifestyles

**Eleni Fotopoulou**

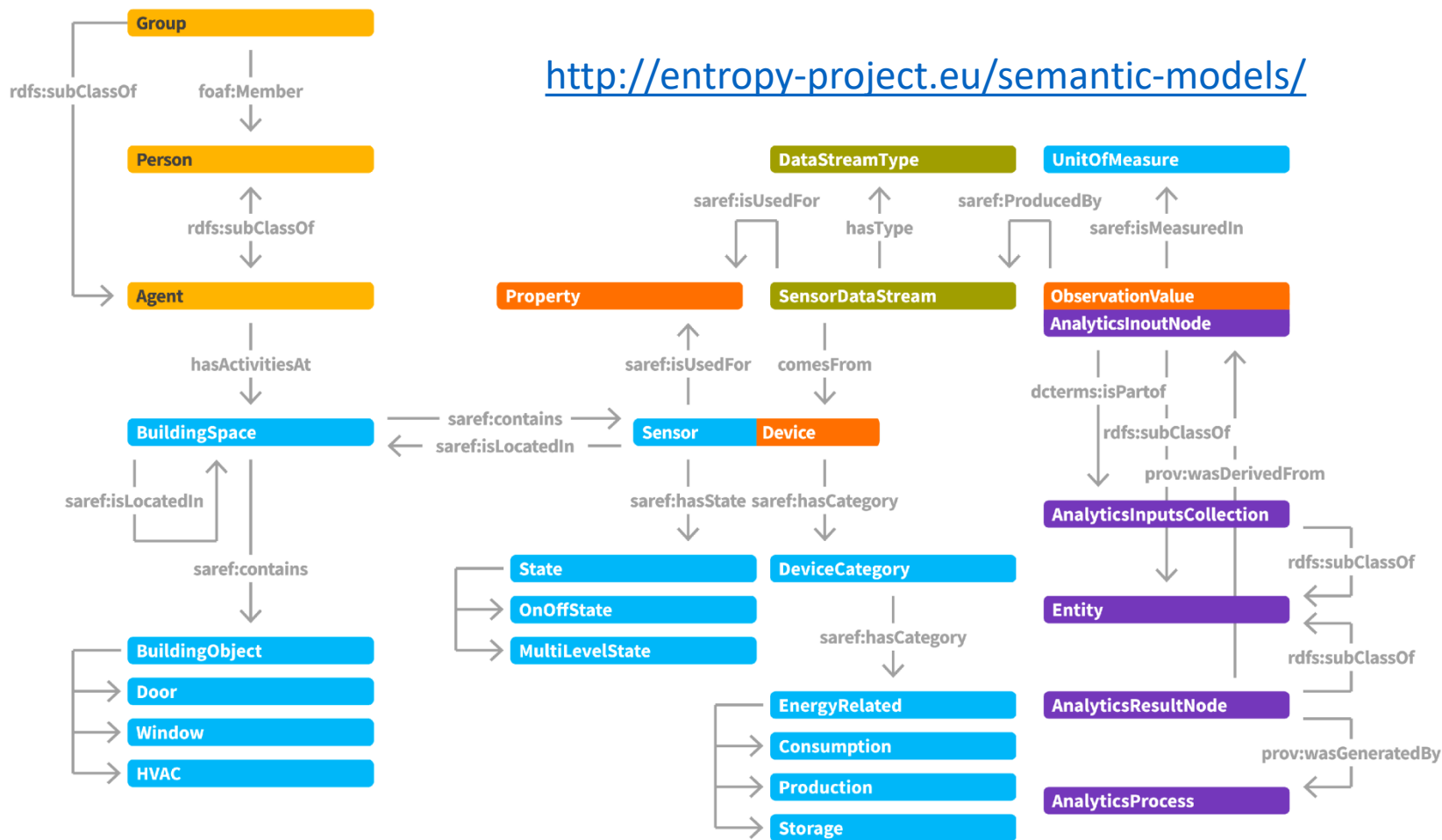
Senior Software Engineer, UBITECH

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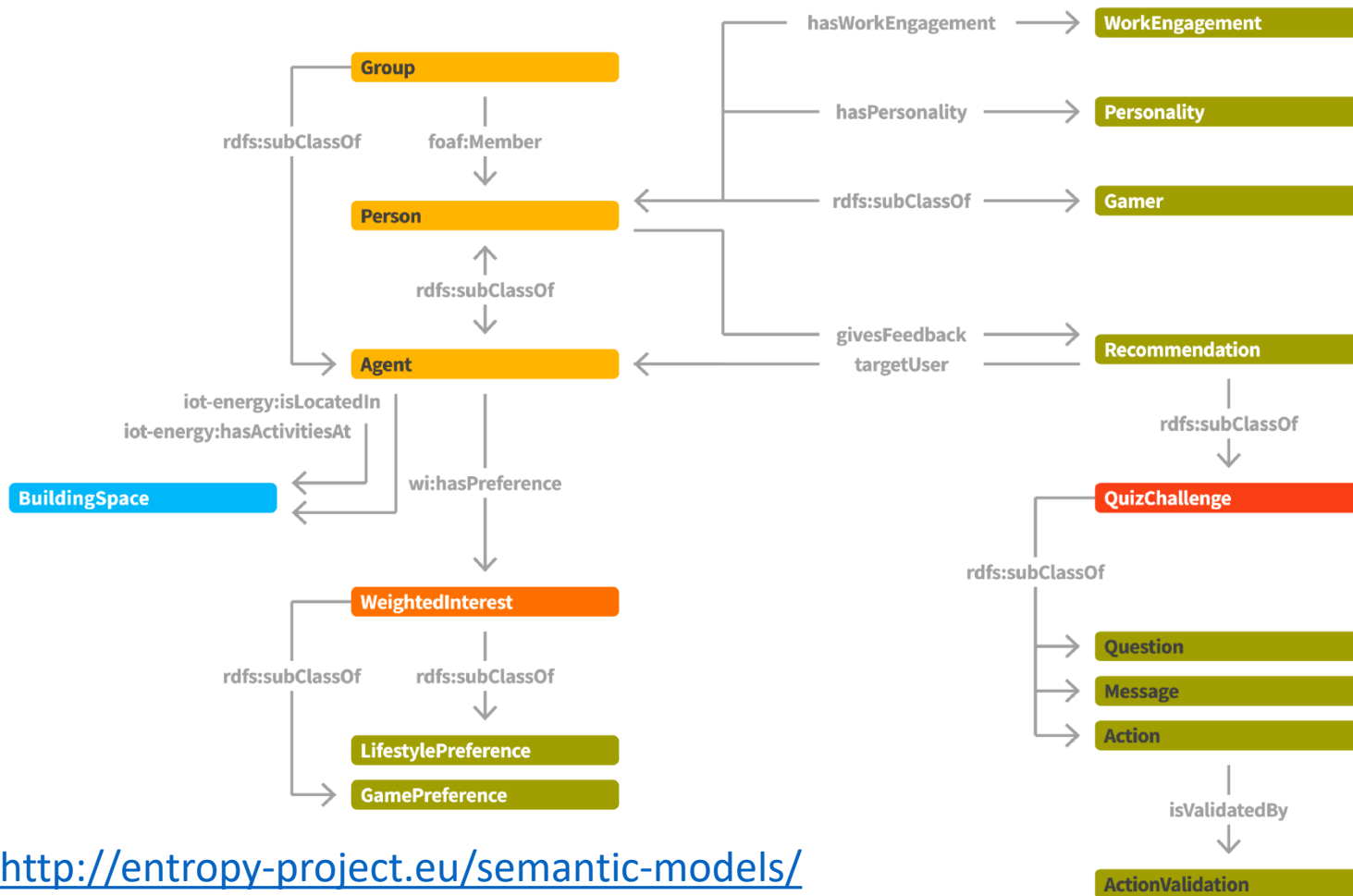
- Provide an **energy-aware IT ecosystem** aiming to support **energy efficiency in the buildings sector** through **behavioral change of the occupants** with regards to their daily energy consumption patterns.
- Exploit **novel data aggregation and management solutions**.
- **Semantically align data** based on **ENTROPY Semantic Models**.
- Materialise a **personalised recommendation framework** based on a rules-based management system, promoting **engagement** and **behavioural change**.
- Materialise a **big data analytics** framework, **detaching the design, development and execution** of data analysis processes.
- **Integrate** and combine set of services and provide them through **open APIs** to application/game developers.
- Develop **serious games** and **personal applications** as enablers of the communication towards behavioural change
- **Engage and empower citizens**, making them actors for the transition to a more efficient society.
- **Validate and evaluate** the research results with proof-of-concept showcases in three countries.



<http://entropy-project.eu/semantic-models/>

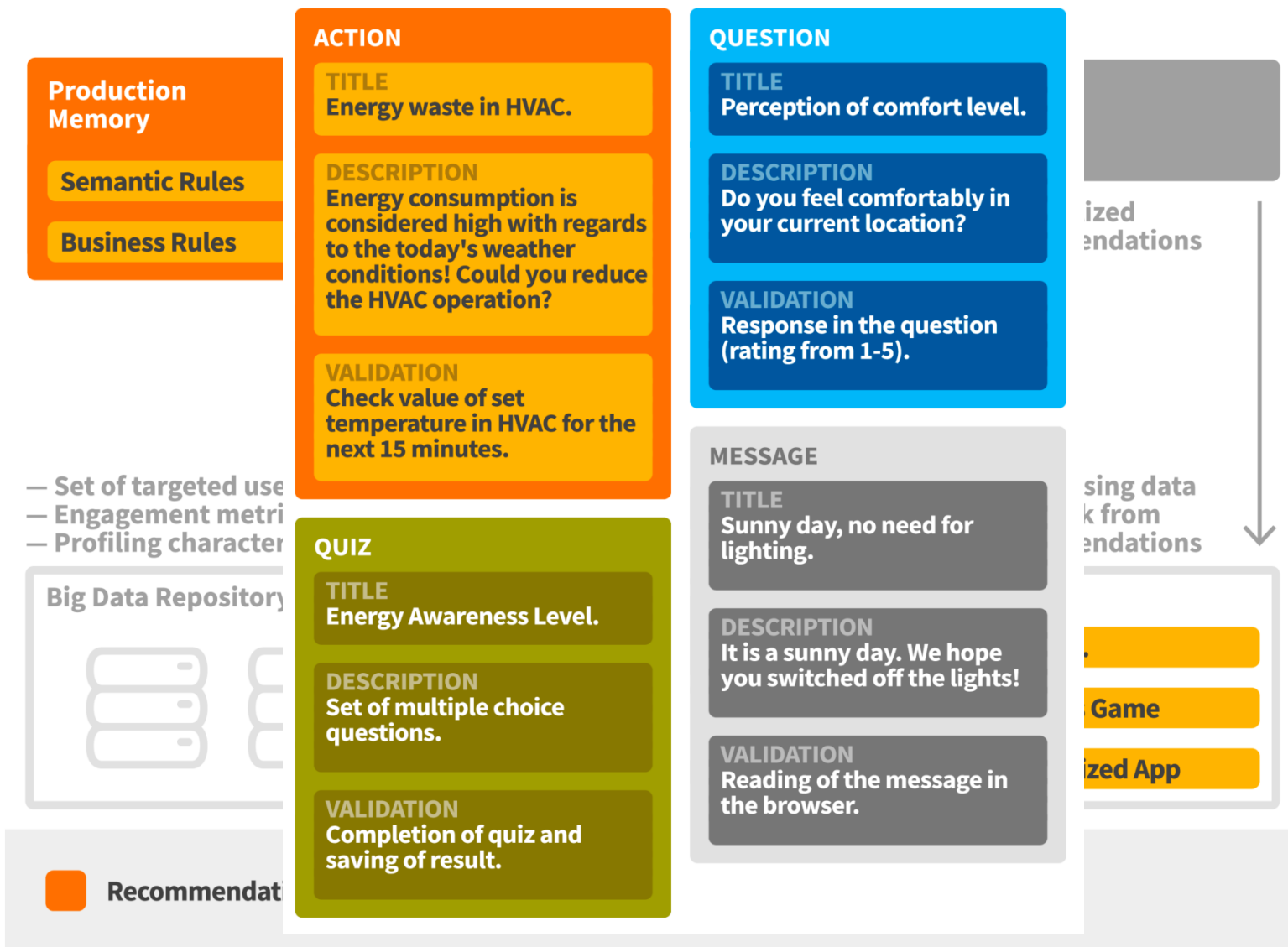


IoT-Energy (green) FOAF (yellow) LDAO (purple) SAREF (blue) SSN (orange)



<http://entropy-project.eu/semantic-models/>

EBIO
  FOAF
  GO
  SAREF
  WI



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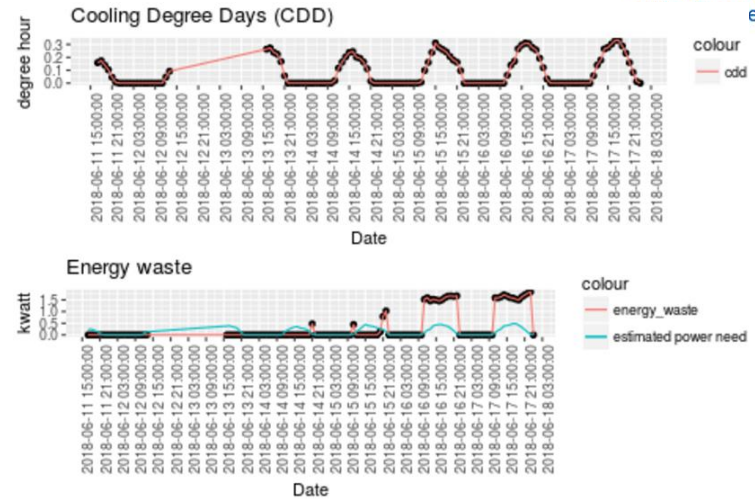
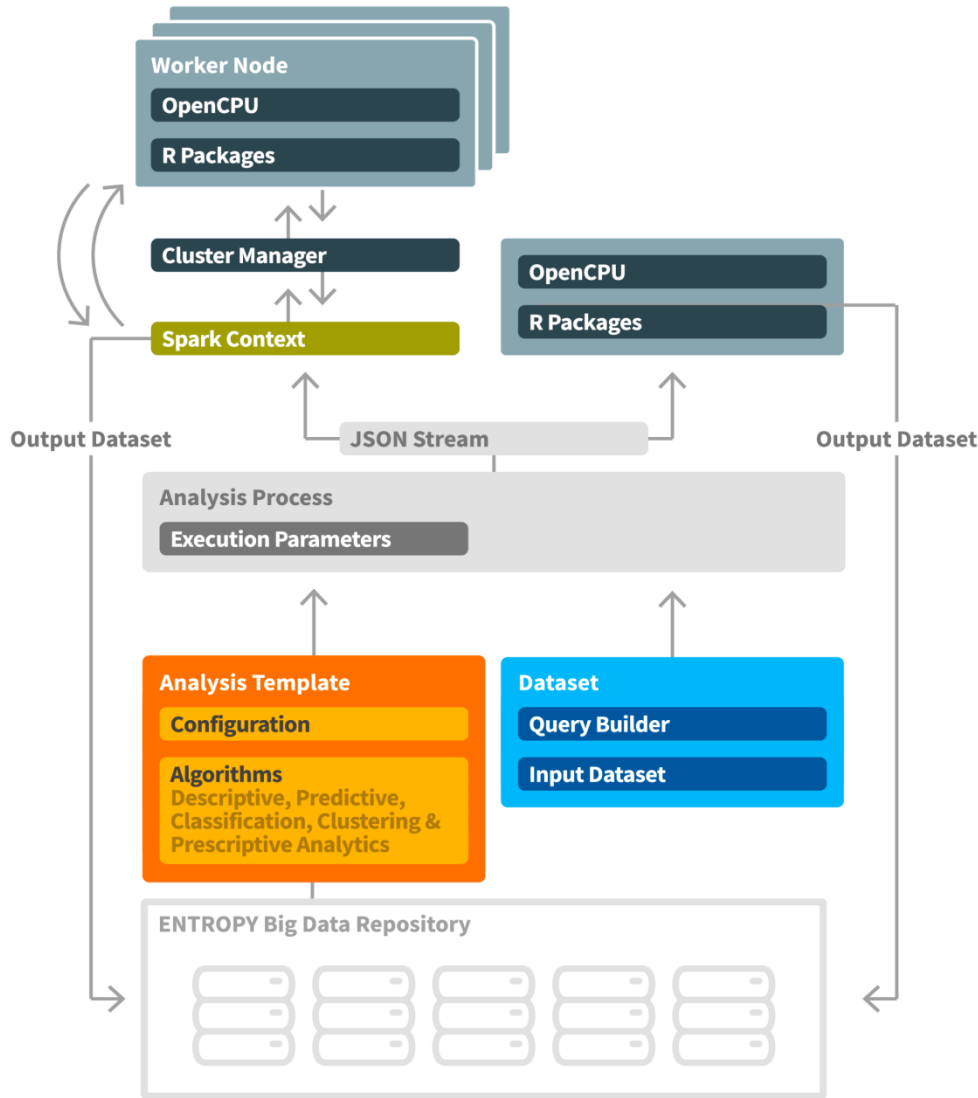
DASHBOARD

- Messages
- Analytics
- Queries
- Streams
- Sensors
- Areas
- Campaigns
- Help

Room 1.16

Wolfindel	TIP	Turn off all non-essential appliances. For example, turn off appliances like computers, printers and coffee machines when no one is using them - don't leave them on standby.	UMU Tip 02	Trigger Tip 02 in All Rooms when Appliances consume much in closed hours in Room 1.16	Mon Jun 18 03:15:27 UTC 2018
acanovas@odins.es	TIP ▲ POSITIVE	Turn off all non-essential appliances. For example, turn off appliances like computers, printers and coffee machines when no one is using them - don't leave them on standby.	UMU Tip 02	Trigger Tip 02 in All Rooms when Appliances consume much in closed hours in Room 1.16	Mon Jun 18 03:15:27 UTC 2018
jamartinez	TIP	Turn off all non-essential appliances. For example, turn off appliances like computers, printers and coffee machines when no one is using them - don't leave them on standby.	UMU Tip 02	Trigger Tip 02 in All Rooms when Appliances consume much in closed hours in Room 1.16	Mon Jun 18 03:15:27 UTC 2018
jandres	TIP ▲ POSITIVE	Turn off all non-essential appliances. For example, turn off appliances like computers, printers and coffee machines when no one is using them - don't leave them on standby.	UMU Tip 02	Trigger Tip 02 in All Rooms when Appliances consume much in closed hours in Room 1.16	Mon Jun 18 03:15:27 UTC 2018

UPDATE
Reset



Calculation of cooling degree days & energy waste

### Statistic View

Users metrics

(pre) Personal Motives

Amotivation	5	5	4	6	1	1	2
External Regulation	2	7	5	7	0	1	2
Introjected Regulation	1	0	3	5	1	8	6
Identified Regulation	1	0	1	3	2	4	13
Integrated Regulation	1	0	5	6	4	4	4
Intrinsic Motivation	1	0	3	6	2	7	5
	(0,1]	(1,2]	(2,3]	(3,4]	(4,5]	(5,6]	(6,7]

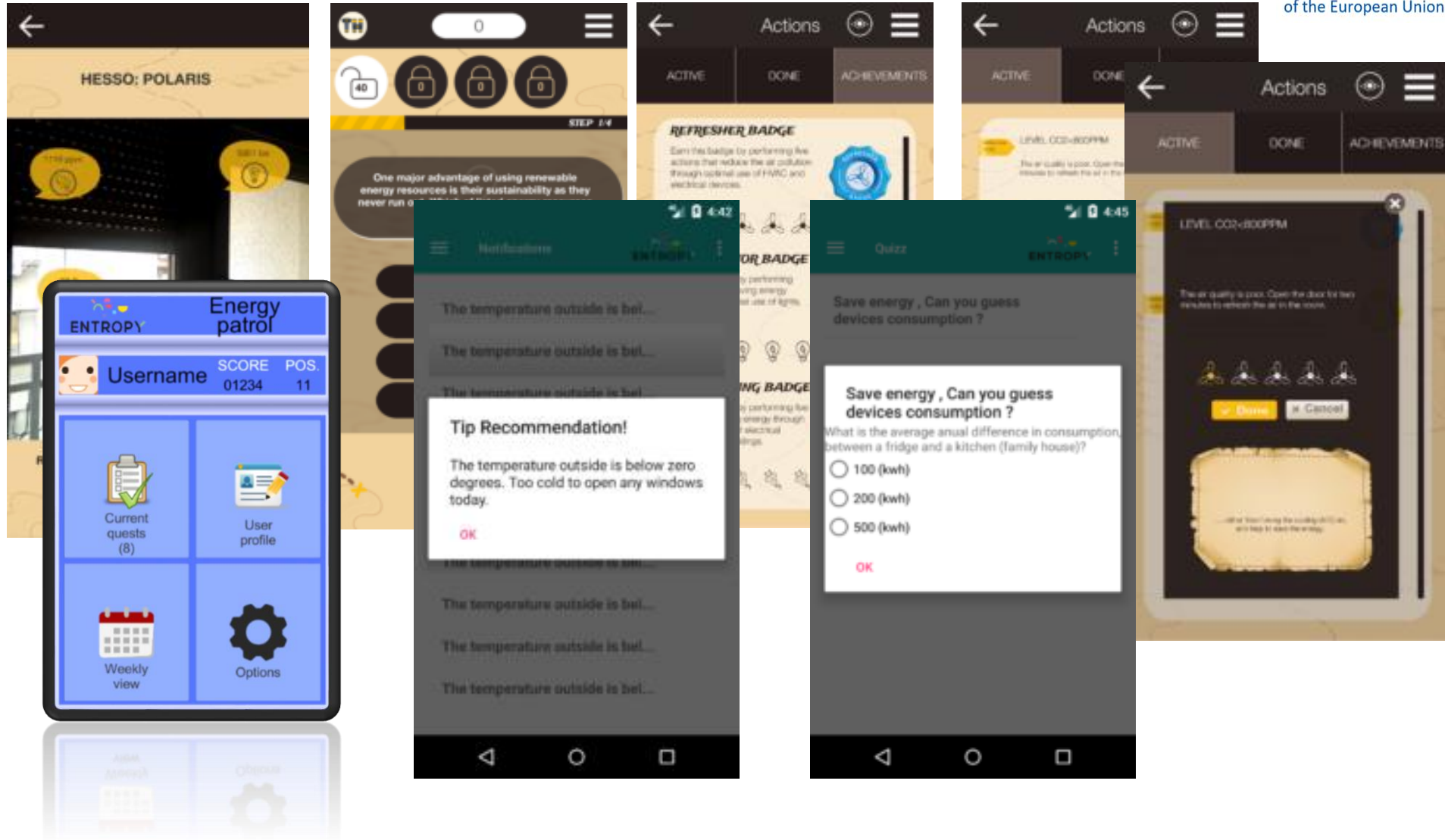
Heatmap with behavioral characteristics



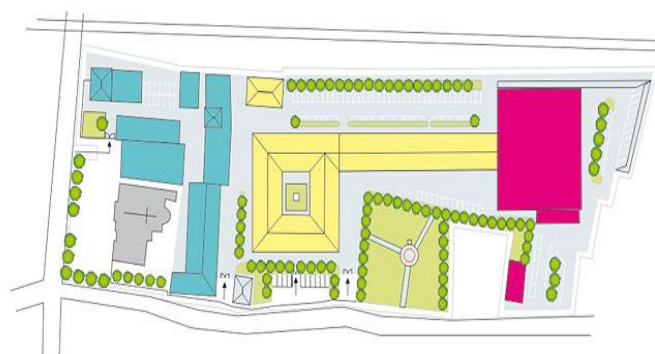
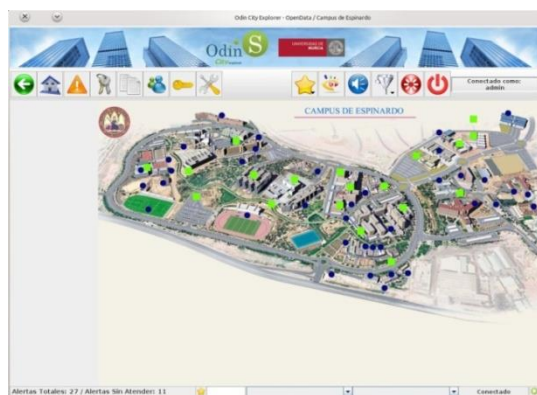
# Serious Games and Personalised Applications



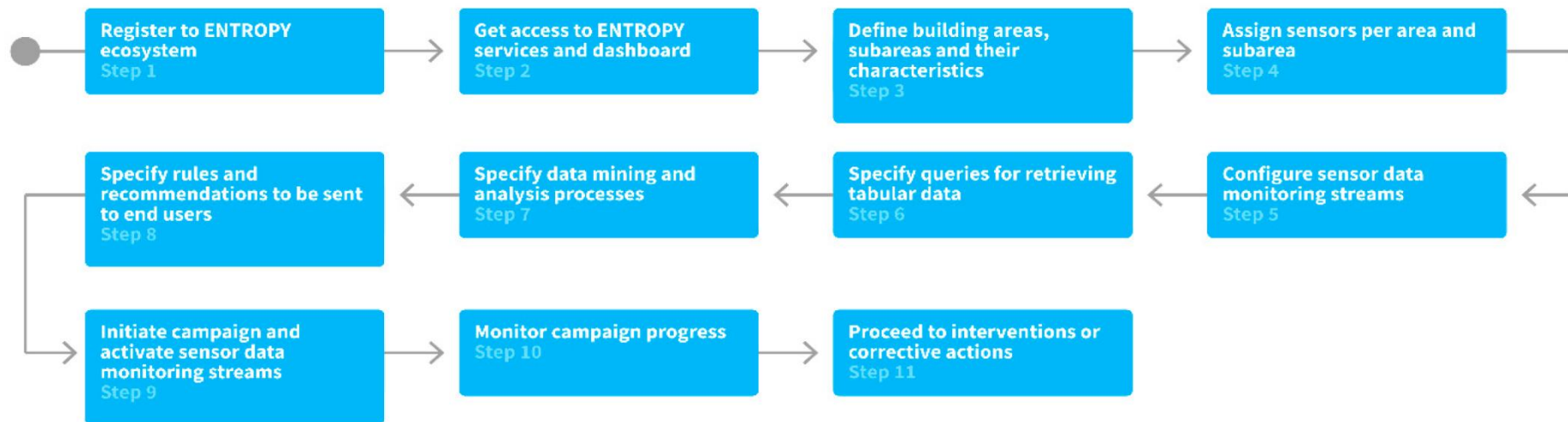
Funded by the H2020 Framework Programme of the European Union



User Community	Pilot Context – Types of Public-owned Buildings	Variables monitored	Estimated number of users	Leading Partner
Employees and visitors in the technology park, residents in the social housing infrastructure	Offices, Social Housing, Incubator, Canteen, Kindergarten, Auditorium, Meeting Rooms	Electricity use, Temperature, Humidity, CO2, Illuminance, among others	Aprox 65	POLO
Students and employees in the University and the Incubators	Classrooms, University Buildings (e.g. Library), Incubator	Electricity use, Temperature, Illuminance, CO2, among others	Aprox 50	UMU
Students and employees in the University and the Incubators	Research institutes labs and offices, a restaurant, fitness room and multiple classrooms.	Electricity use, Temperature, Humidity CO2, Illuminance, among others	Aprox 60	HESSO

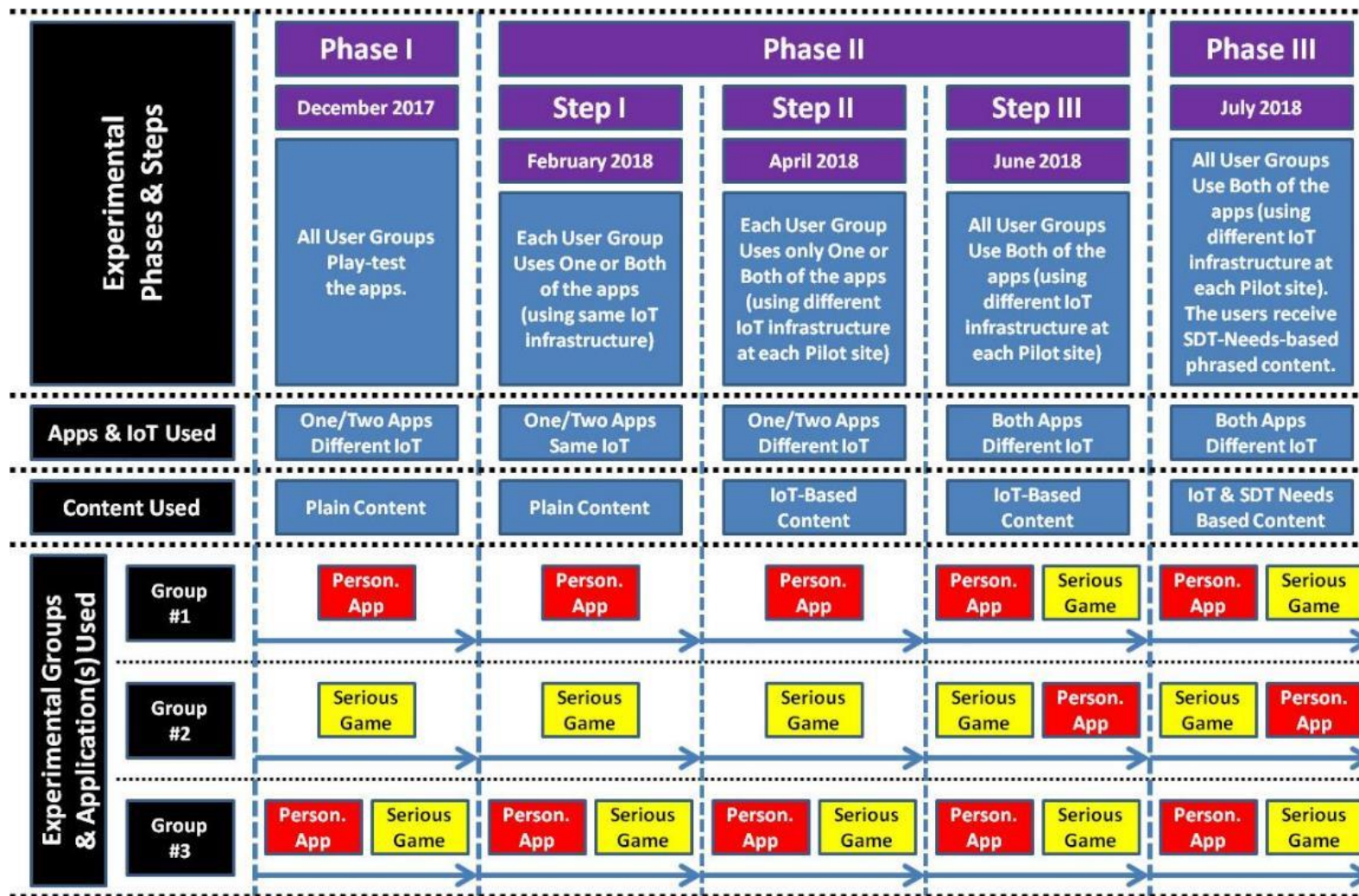


## CAMPAIGN MANAGER



## END USER



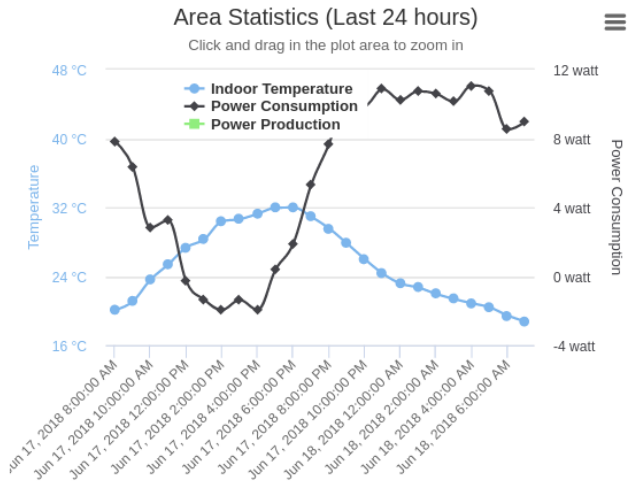


Area View

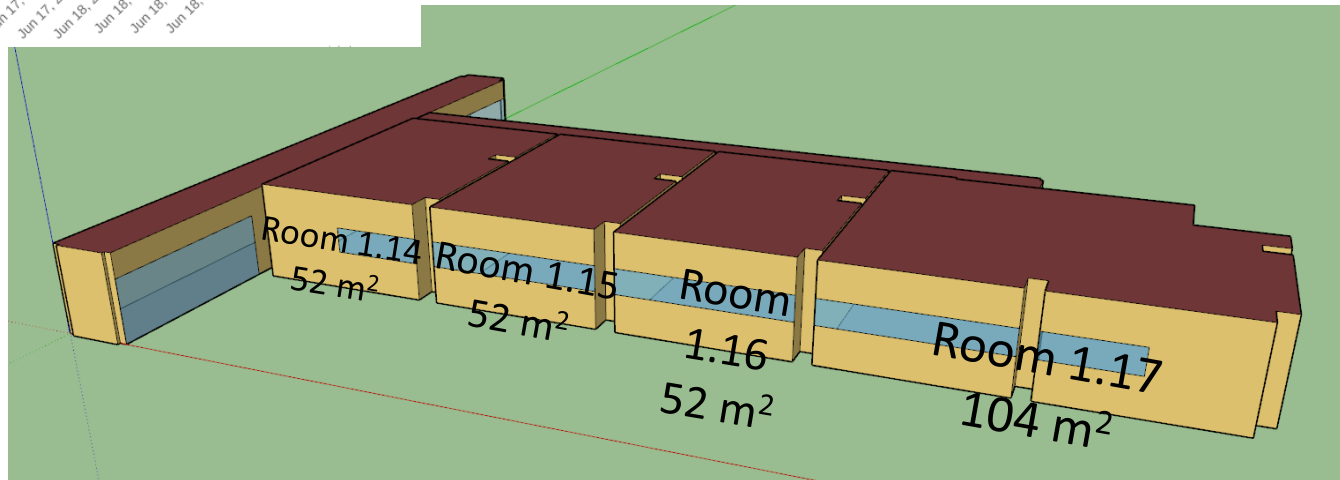
Defaults Streams per area

# pleiades

260 m<sup>2</sup> / 30 people / University\_Building



Pleiades Building



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/ AREAS / PLEIADES

← Subareas + NEW SUBAREA

View Registered Sub Areas for "pleiades"

	<p style="font-weight: bold; font-size: 1.1em;">Room 1.17</p> <p style="font-size: 0.8em;">104.0 m<sup>2</sup> / 8 people / Lab</p> <p style="font-size: 0.8em;">Heat Transfer Coefficient 1.44324 kW/K</p>	STREAMS	SENSORS	SUBAREAS	EDIT	DELETE
	<p style="font-weight: bold; font-size: 1.1em;">Room 1.16</p> <p style="font-size: 0.8em;">52.0 m<sup>2</sup> / 6 people / Office</p> <p style="font-size: 0.8em;">Heat Transfer Coefficient 0.72162 kW/K</p>	STREAMS	SENSORS	SUBAREAS	EDIT	DELETE
	<p style="font-weight: bold; font-size: 1.1em;">Room 1.15</p> <p style="font-size: 0.8em;">52.0 m<sup>2</sup> / 6 people / Office</p> <p style="font-size: 0.8em;">Heat Transfer Coefficient 0.72162 kW/K</p>	STREAMS	SENSORS	SUBAREAS	EDIT	DELETE
	<p style="font-weight: bold; font-size: 1.1em;">Room 1.14</p> <p style="font-size: 0.8em;">52.0 m<sup>2</sup> / 6 people / Office</p> <p style="font-size: 0.8em;">Heat Transfer Coefficient 0.72162 kW/K</p>	STREAMS	SENSORS	SUBAREAS	EDIT	DELETE
	<p style="font-weight: bold; font-size: 1.1em;">ExternalWeather</p> <p style="font-size: 0.8em;">1.0 m<sup>2</sup> / 10 people / Corridor</p> <p style="font-size: 0.8em;">Heat Transfer Coefficient 0.01388 kW/K</p>	STREAMS	SENSORS	SUBAREAS	EDIT	DELETE

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Sensors

Manage Sensors [SYNCHRONIZE SENSORS](#)

 <p style="font-weight: bold; font-size: 1.2em;">122</p> <p>ambient_co2</p> <p> lanave</p>	<p><a href="#">VIEW STREAMS</a></p> <p><a href="#">NEW STREAM</a></p>
 <p style="font-weight: bold; font-size: 1.2em;">123</p> <p>ambient_co2</p> <p> lanave</p>	<p><a href="#">VIEW STREAMS</a></p> <p><a href="#">NEW STREAM</a></p>
 <p style="font-weight: bold; font-size: 1.2em;">12345678</p> <p>ambient_co2</p> <p> pleiades</p>	<p><a href="#">VIEW STREAMS</a></p> <p><a href="#">NEW STREAM</a></p>
 <p style="font-weight: bold; font-size: 1.2em;">12345679</p> <p>ambient_co2</p> <p> pleiades</p>	<p><a href="#">VIEW STREAMS</a></p> <p><a href="#">NEW STREAM</a></p>

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/ STREAMS


## Streams

Manage Sensors Streams




**Default Main Stream temperatureIndoorSensor**  
**335547901** AGGREGATED ●

5b212f294d2113412fa43c12 / temperature\_indoor / 335547901 / hour


 pleiades / Room 1.17

[START](#)
[GRAPH](#)
[DELETE](#)




**Temperature Room 1.17 B** REAL-TIME ●

5b20e88d4d2113412fa43be5 / temperature / 335547901 / 15 minutes


 pleiades / Room 1.17

[PAUSE](#)
[GRAPH](#)
[DELETE](#)




**General Active Power Phase 3 in Pleiades** REAL-TIME ●

5b1fec904d2113655af8b062 / active\_power / 335546925 / 15 minutes


 pleiades

[PAUSE](#)
[GRAPH](#)
[DELETE](#)




**General Active Power Phase 2 in Pleiades** REAL-TIME ●

5b1fec4e4d2113655af8b061 / active\_power / 335546925 / 15 minutes

 pleiades

[PAUSE](#)
[GRAPH](#)
[DELETE](#)





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/ DASHBOARD

## Dashboard

Platform Overview

### Statistics

Information on platform usage

<b>40</b>	<b>601</b>	<b>114</b>	<b>29</b>
Areas	Sensors	Streams	Users

Current Campaign: Forth Campaign

<b>32 - 0 - 50</b>	<b>11 - 0 - 101</b>	<b>85 - 0 - 160</b>	<b>4 - 0 - 10</b>
Quizzes (82)	Tasks (112)	Tips (245)	Questions (14)

### Degree days

Heating and Cooling Degree Days

Select a sub-area

### Statistic View

Users metrics

(pre) Energy – Saving a

### Weather

Weather information for Las Torres de Cotillas, Murcia

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Sunny 77 %

19 °C Humidity

18 - 32 6.44 km/h


Wind

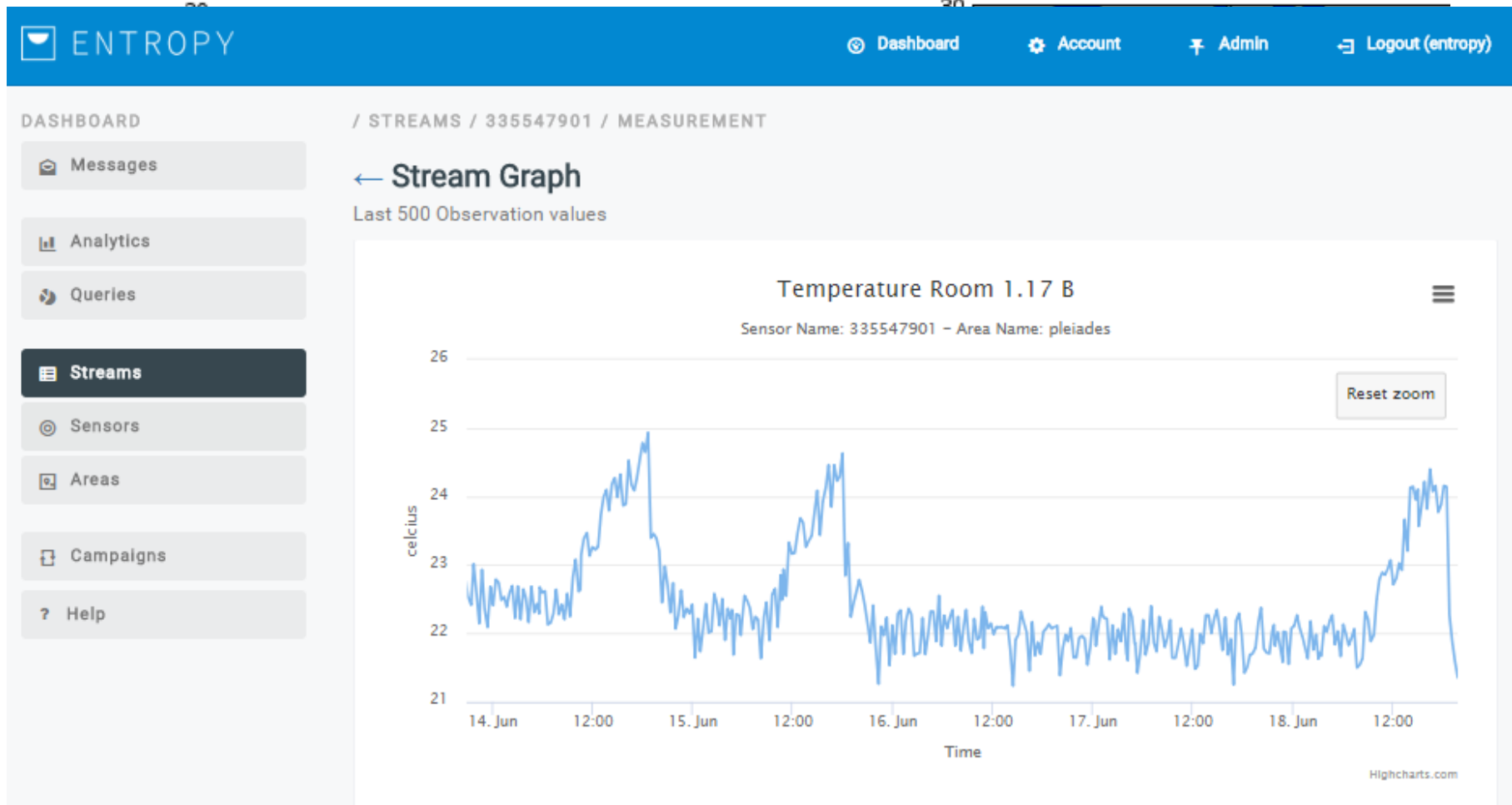
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### Connected Applications

Your apps profile overview

Select your connected app





DASHBOARD

Messages

Analytics

Queries

Streams

Sensors

Areas

**Campaigns**

Help

/ EVALUATIONS

## Campaigns

Campaigns Results

81 - 0 - 401  
Quizzes (482)

5 - 0 - 144  
Tasks (149)

73 - 0 - 220  
Tips (293)

5 - 0 - 25  
Questions (30)

### Comments

Users comments

Thanks to ENTROPY applications, I have learned a lot of things about reducing energy consumption at work and home. In my opinion, these applications must be used in private companies and public entities to obtain certificates of energy efficiency and sustainability such as ISO 14001.

Cualquier proyecto que tenga como objetivo el uso responsable de los recursos energéticos es una gran idea. La concienciación de la sociedad en estos temas es fundamental, pero las leyes que lo regulen (muy especialmente las aplicadas a las empresas menos responsables) lo son más. Respecto a la campaña, mi valoración es muy positiva. Únicamente mejoraría la aplicación Energy Awareness Entropy, versión UMU, ya que desde el comienzo ha presentado muchos fallos de implementación, que hasta la fecha siguen sin solucionarse. Teniendo en cuenta que es la herramienta principal de interacción con la campaña es importante que hubiera funcionado correctamente.

thank you!



<http://entropy-project.eu/>

<https://twitter.com/EntropyEu>

<https://www.facebook.com/entropyproject>



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