From Data to Insights: Advanced Segmentation and Behavioural Analytics in Smart Building Environments

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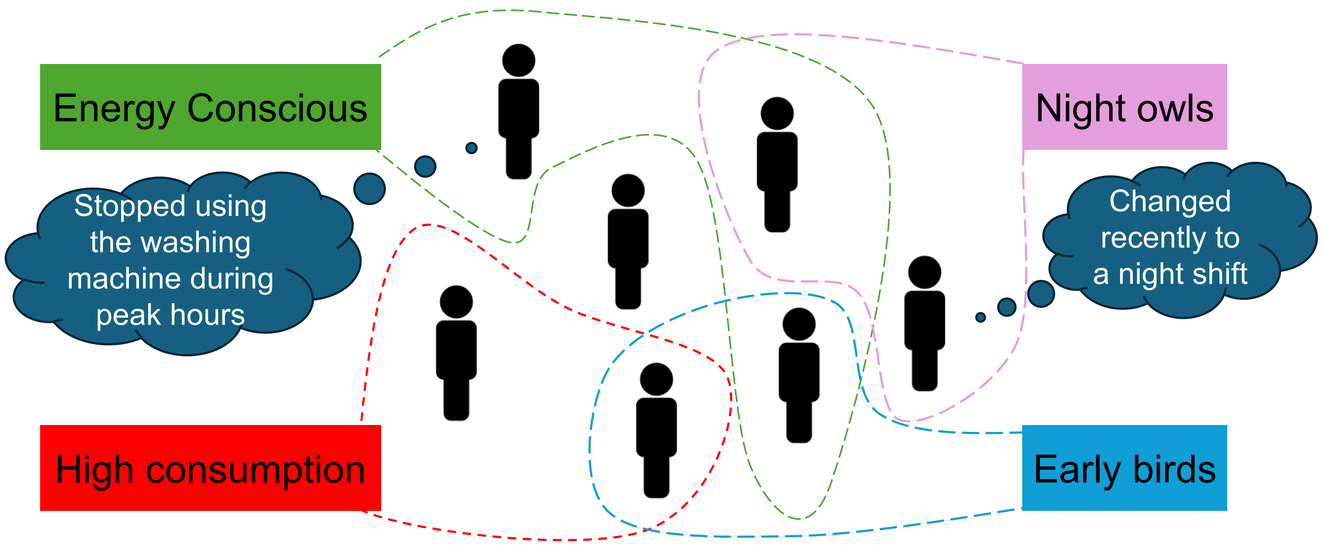
Taighde Éireann Research Ireland

The problem we focus on

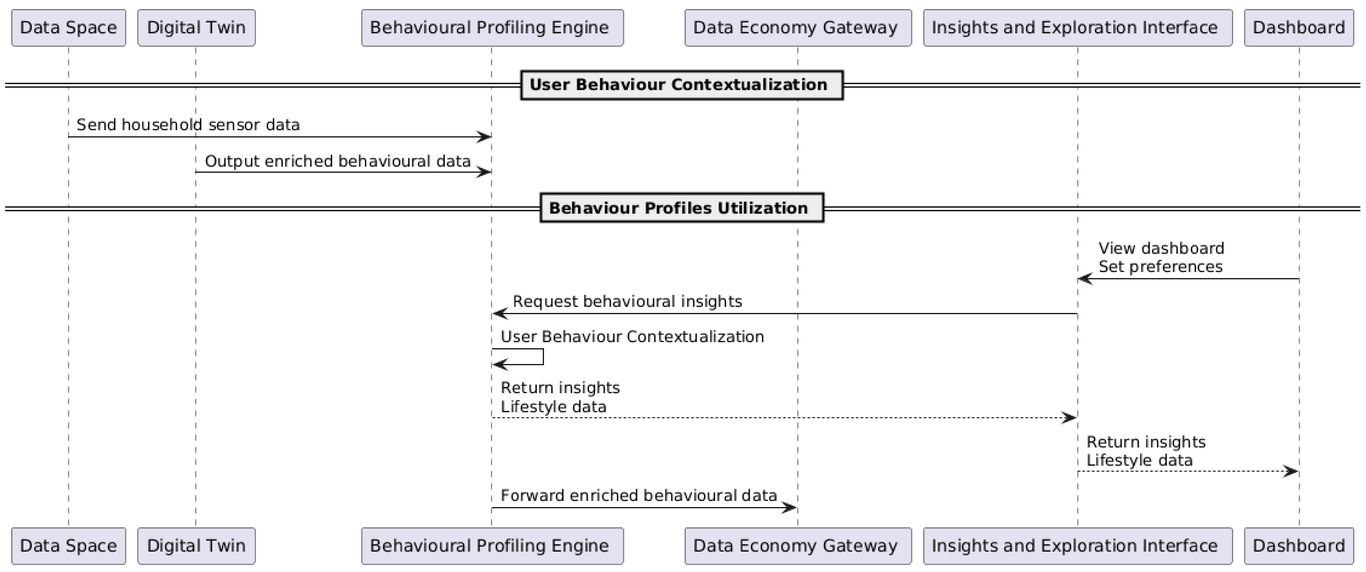


Motivation

The Behavioural Profiling and Insights Application aims to enroll household citizens in data economy by providing added value on the data through the extraction of useful insights and user habits that may be utilized in purposes other than energy.

- Digital Twin simulation utilization
- Behavioural characteristics extraction
- Anomaly detection – deviations from profiles

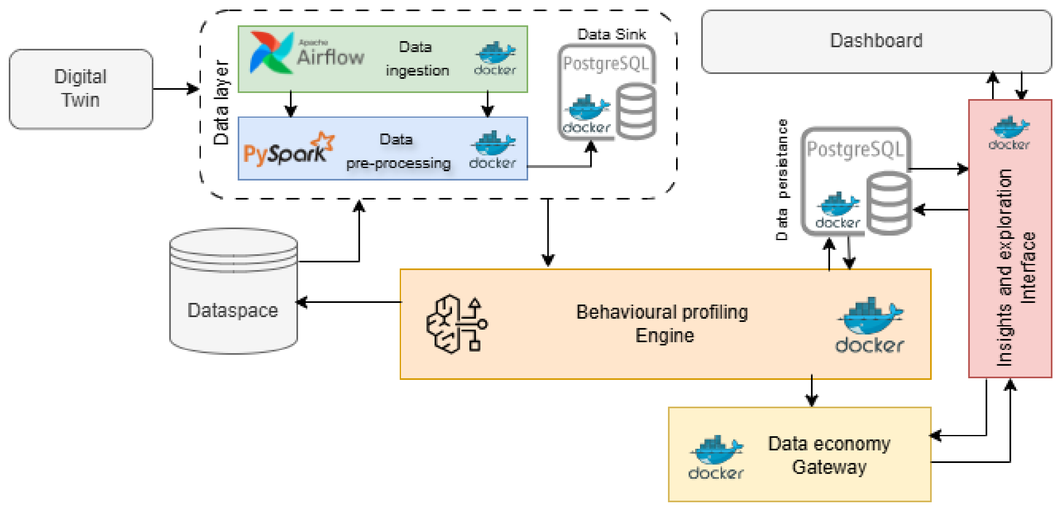
Behavioural profiling and insights application



Core Components

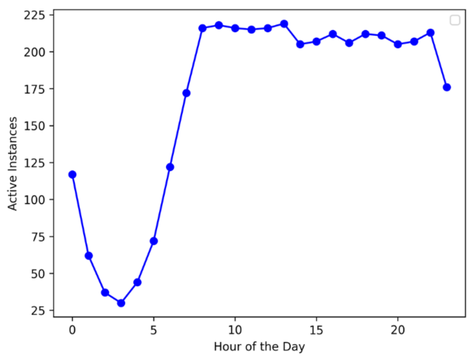
- Behavioural Profiling Engine
- Insights and Exploration Interface
- Data Economy Gateway

➢ Clusters ➢ Lifestyle profiling labels ➢ Behavior predictions



Supported Functionality

Activity of a user over a year

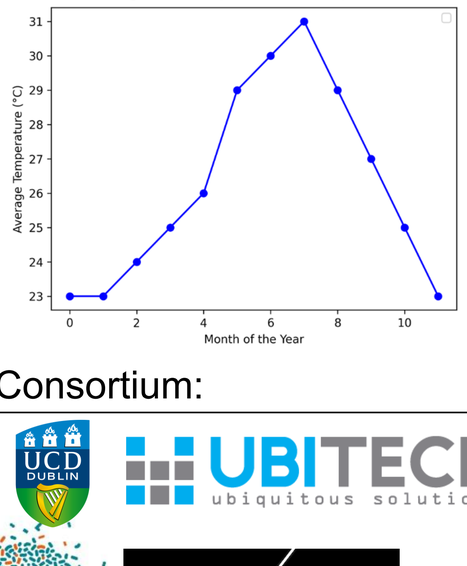


Top-10 users for “early-bird” vs “night owl” label, for a year

#	user	count
0	MIW-U0030	276
1	MIW-U0026	266
2	MIW-U0035	256
3	MIW-U0036	222
4	MIW-U0029	194
5	MIW-U0025	182
6	MIW-U0033	152
7	MIW-U0034	139
8	MIW-U0031	119
9	MIW-U0028	92

#	user	count
0	MIW-U0026	269
1	MIW-U0030	216
2	MIW-U0035	190
3	MIW-U0036	185
4	MIW-U0029	174
5	MIW-U0025	142
6	MIW-U0031	129
7	MIW-U0033	77
8	MIW-U0028	76
9	MIW-U0024	56

Average temperature per month



“Energy-conscious” and “high-consumption” users, for a year

#	user	count
0	MIW-U0022	182
1	MIW-U0023	1
2	MIW-U0024	28
3	MIW-U0025	462
4	MIW-U0026	24
5	MIW-U0027	183
6	MIW-U0028	240
7	MIW-U0029	87
8	MIW-U0030	2
9	MIW-U0031	364
10	MIW-U0033	2

#	user
0	MIW-U0023
1	MIW-U0032
2	MIW-U0035

Future Work

- Digital Twin integration and utilization
- Personalized behavioural predictions
- Personal baseline comparisons
- Additional clusters
- Additional lifestyle labels
- Continuous profile enrichment

Consortium:

<u>Conclusion:</u> Via harnessing the power of Digital Twin modelling alongside machine learning behavioural prediction and clustering techniques we provide insights to prosumers, energy providers and other stakeholders to further enhance energy literacy, community engagement, and data marketability.

HOST INSTITUTIONS: DCU; Ollscoil na Gaillimhe University of Galway; UCC University College Cork, Ireland; University College Dublin An Coláiste Ollscoile, Baile Átha Cliath

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