



Energy Gamification: development of a user interface tool to upgrade the social experience and energy literacy.

João Cravinho



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08/09/22

Agenda

1. From Games to Gamification: bringing the motivational potential of gaming environments to the real world
2. Gamifying the energy sector: a critical review
3. Smart2B's proposal: gamified module for energy efficiency and energy conservation behavior-change
4. Final remarks & next steps



Smart2B
Smartness *to* existing Buildings



01

From Games to Gamification: bringing the motivational potential of gaming environments to the real world





Games & Video Games



- One of the most wide-spread strategies humans' resource to interact, communicate & have fun
- Video games and digital technology - universalization of access
- Central entertainment media of the future¹.
- Users motivational and behavior-change potential extensively covered.

Serious games



- Non-entertainment driven video games
- Educational perspective
- Users motivational and behavior-change potential covered and implemented in various activity sectors² (e.g., education, defense, city planning, engineering)

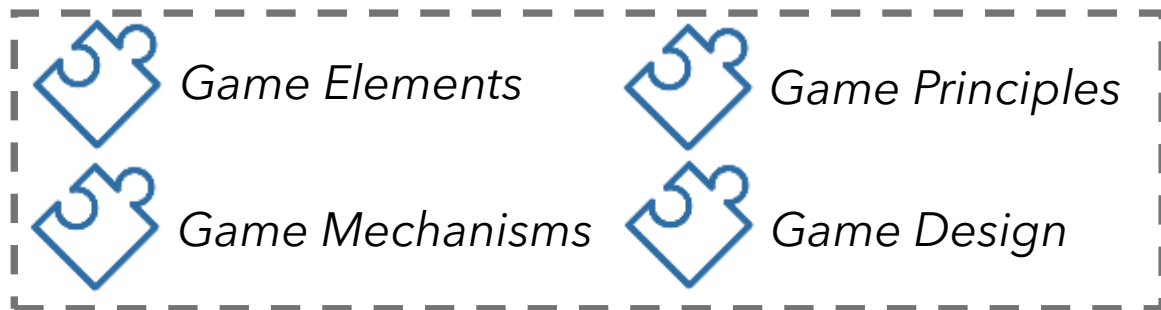




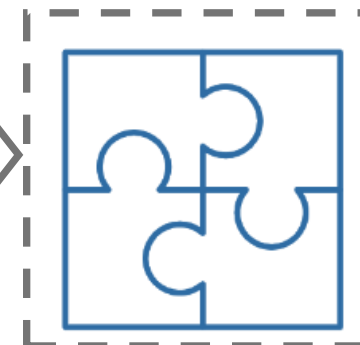
Gamification - “the use of elements of game-playing in another activity, in order to make that activity more interesting”

*Oxford Advanced Learner's Dictionary
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Game environment



Non-game environment



Non-game activities
(e.g., real-life)



Effectiveness

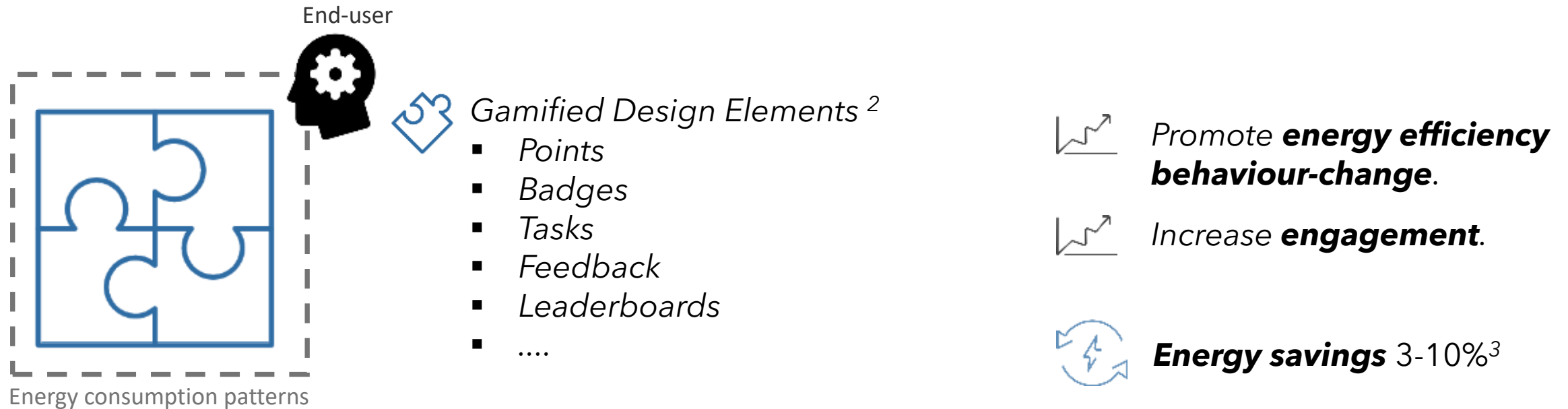


Engagement

02

Gamifying the energy sector: a critical review





- small sample size
 - limited number of commercially-ready/available products
 - scarcity of systematic studies (in the energy sector)
- Lack of empirical evidence & knowledge on most effective gamification strategies⁴

²- Wee, S.-C., & Choong, W.-W. (2019). Gamification: Predicting the effectiveness of variety game design elements. *Journal of Environmental Management*, 233, 97-106

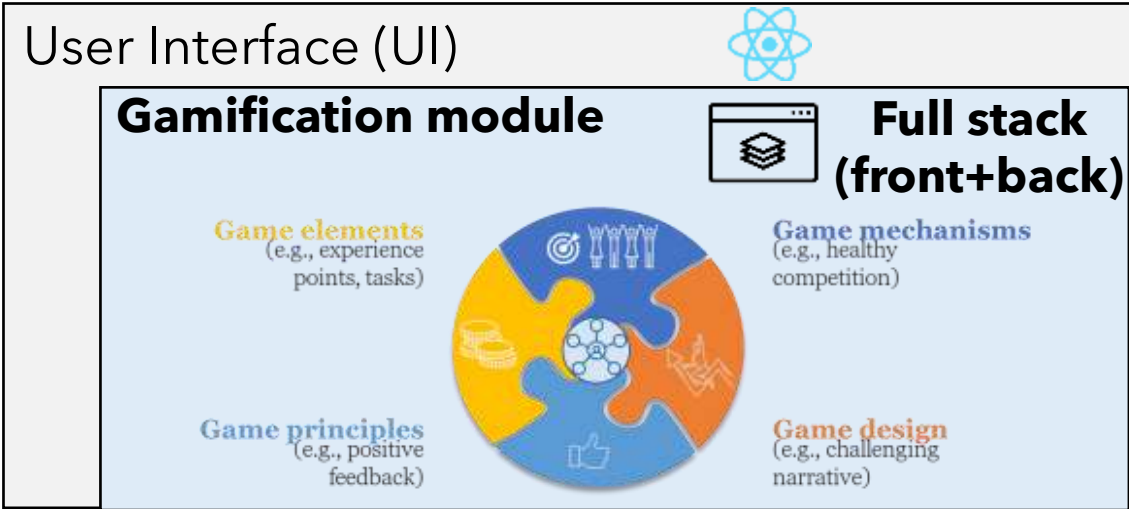
³- Grossberg, F.; Wolfson, M.; Mazur-Stommen, S.; Farley, K.; Nadel, S. (2015). Gamified Energy Efficiency Programs. Report Number B1501, American Council for an Energy-Efficient Economy

⁴- Beck, A.; Chitalia, S.; Rai, V. (2019). Not so gameful: A critical review of gamification in mobile energy applications. *Energy Research & Social Science*, 51(), 32-39. doi:10.1016/j.erss.2019.01.006

03

Smart2B's proposal: gamified module for energy efficiency and energy conservation behavior-change





Promote **energy literacy & behaviour-change**, translating into energy, monetary and environmental (CO₂) **savings**

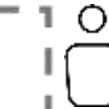


Increase **engagement** (between users and S2B platform).

Smart2B platform environment



- Point system
- Challenges (Missions & Side challenges)
- Rewards
- Feedback
- Leaderboard
- Design and Implementation



Residential energy consumption patterns



- Gamify real-life energy consumption to foster **energy savings**
- Energy consumption **behavior-change**

Smart2B's proposal: Gamified module for energy efficiency and energy conservation behavior-change



Join Smart2B's competition

Earn points by saving energy.
Complete the Smart2B challenges & suggestions, to earn more points and save more energy.



Compete with your peers and prove you are the most efficient while learning & participating in building a more sustainable future.

Participate





J.DOE 

Dashboard

Feedback

Gamification

Settings

Welcome back, J.Doe!

M

T

W

T

F

S

S

x1⚡

Claim XP

Show up everyday to gain more XP!

🕒 20 days left

Monthly Mission

🕒 5 days left

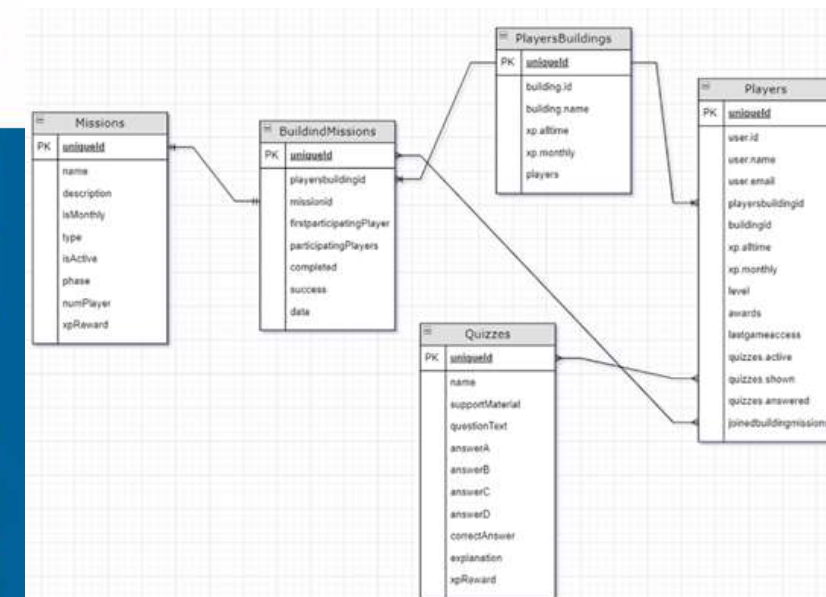
Challenges

Leaderboard

Progress

Challenges

Advisor



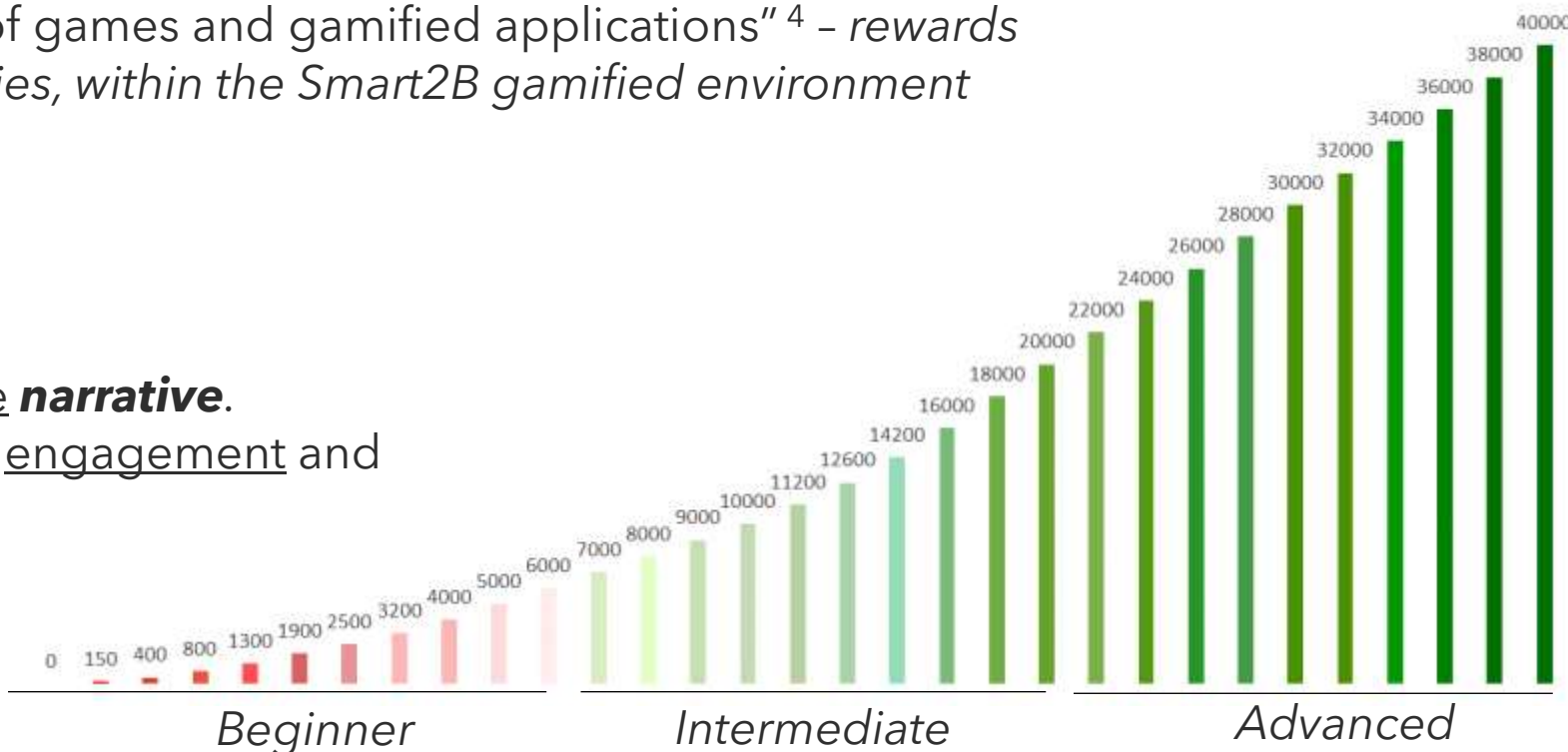


In-game point system

"Points are basic elements of a multitude of games and gamified applications"⁴ – rewards for users who successfully complete activities, within the Smart2B gamified environment

Point-system enables:

- Continuous and immediate **feedback**
- Measures user's **progress**
- Creates an incremental and progressive **narrative**.
- **Attainability**: short and long-term user engagement and progress (*levels vs stages*).





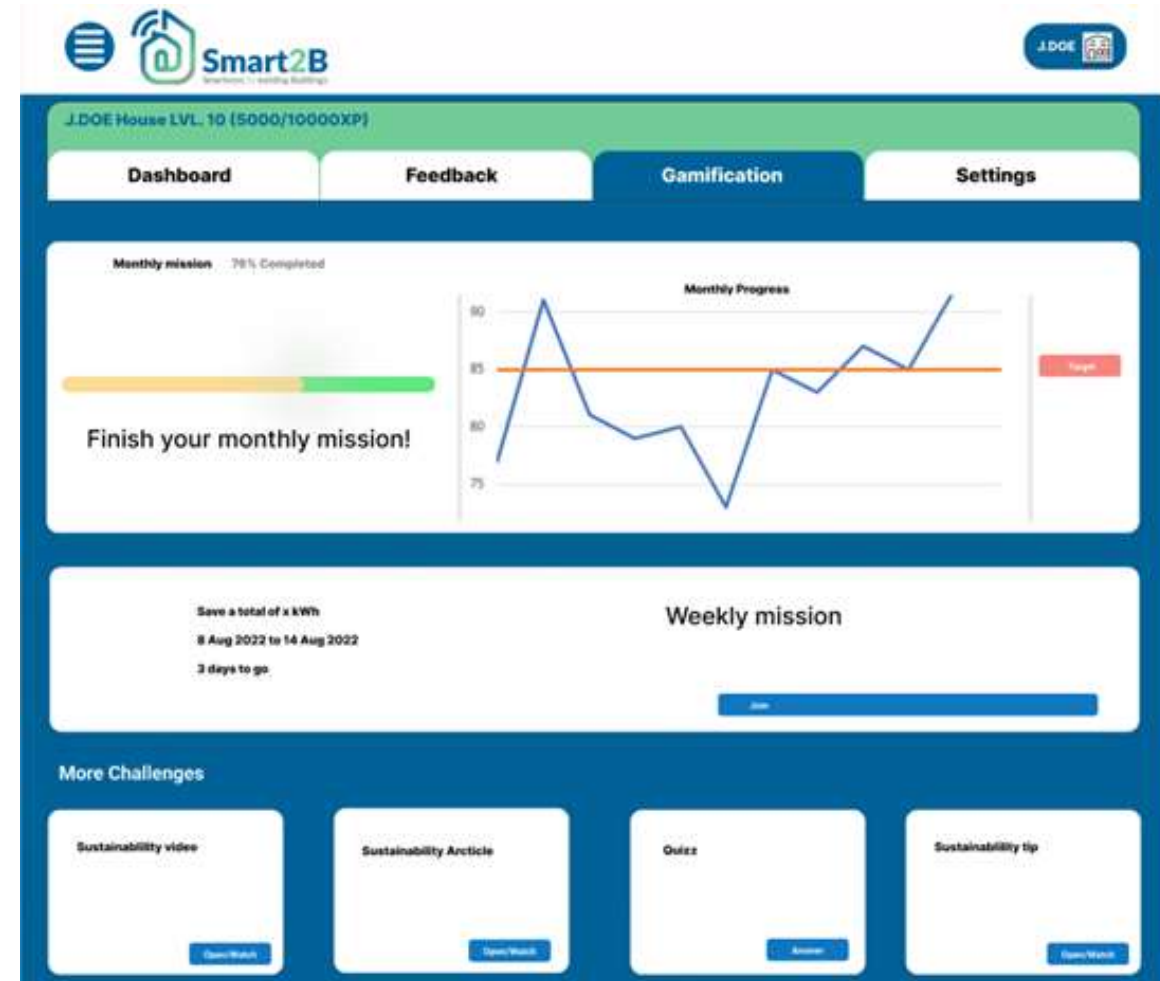
Gamified Challenges

Interactive **activities** through which the accumulate XP points. These activities are of different nature:

- Missions
- Information requests
- Instructional

These enable:

- Measuring user's progress (energy consumption)
- **Attainability**: short and long-term user engagement and progress, furthering **narrative**
- Continuous learning (energy and sustainability)
- *Progressively difficult, promoting engagement*





Gamified Challenges

Building XP: Missions

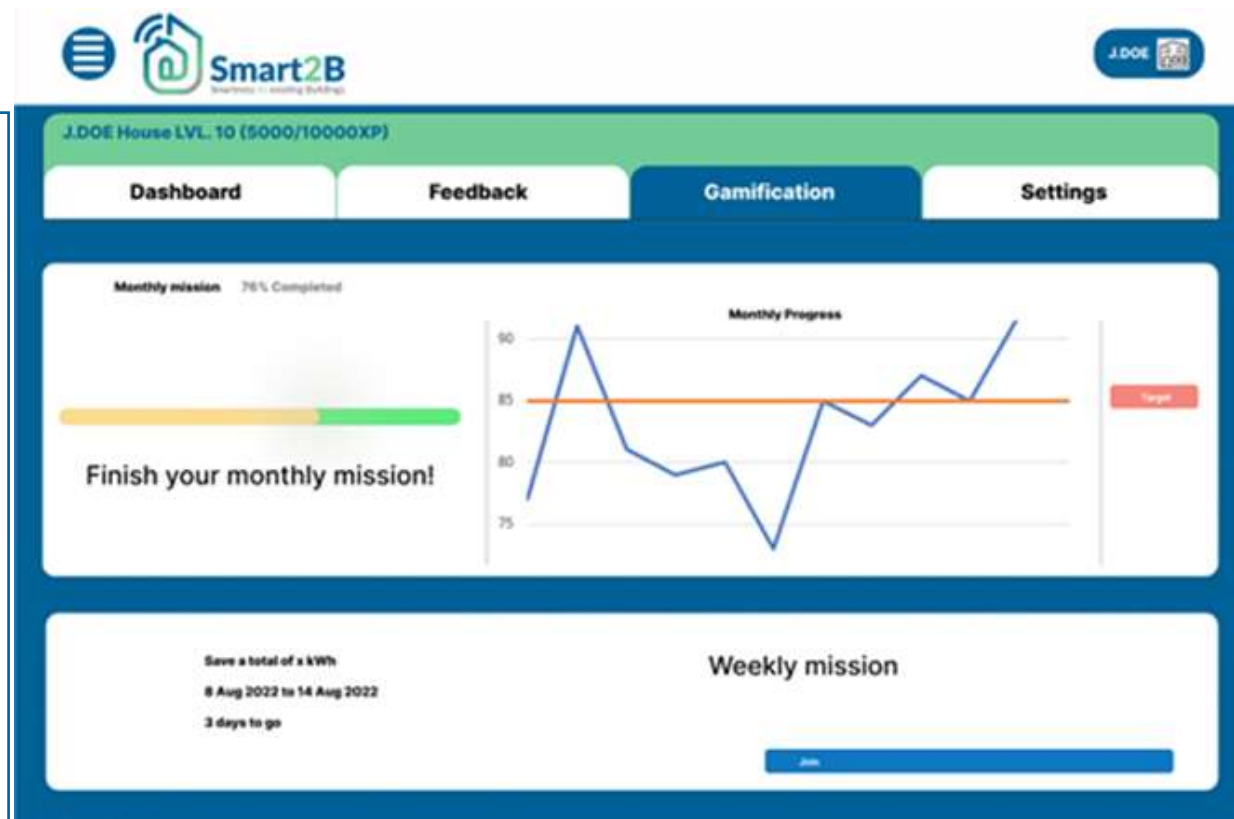
Promote energy savings

- Monthly Mission (200 XP) [1st – 30th/31st]

e.g., "Achieve monthly energy consumption target"

- Weekly Mission (75 XP) [Monday – Saturday]

e.g., "Weekly consumption < average users' consumption"





Gamified Challenges

User XP: Missions + side challenges

Information Requests
(25 XP)

Provide and/or confirm
information (user,
building, feedback)

Educational
(40 XP)



[Monday - Saturday]





Leaderboard

Competition (leaderboards) “create social pressure to increase the player's level of engagement and can consequently have a constructive effect on participation and learning”⁶

Building Leaderboard:

- **Shared goals** (behaviour-change in consumption patterns) between all occupants of the same residency
- In-game & real-life translation (standardized **metrics**)
- **Granularity**: all time & monthly leaderboard (*toggle*)



Metrics

kWh/m²

XP





Leaderboard

Competition (leaderboards) *“create social pressure to increase the player's level of engagement and can consequently have a constructive effect on participation and learning”*⁶

User Leaderboard:

- Increase Smart2B platform users' engagement (*one vs all*)
- In-game progress metric
- **Granularity:** All-time & Monthly (*toggle*)



Metrics



All Time User Leaderboard		
	Bethy	[LEVEL NAME] 5005XP
	Bethy	[LEVEL NAME] 5005XP
	Bethy	[LEVEL NAME] 5005XP
	Bethy	[LEVEL NAME] 5005XP
	Bethy	[LEVEL NAME] 5005XP
	Bethy	[LEVEL NAME] 5005XP



Engagement (& Rewards)

Streak Counter



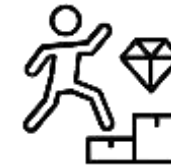
(5 XP – 50 XP)

Weekly Challenges (x4)



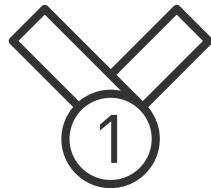
(50 XP)

Monthly bonus



(5 XP per 100 XP earned)

Badges



"(...) badges are a powerful motivational tool and that users are willing to put in a significant amount of work to attain them"³

*Badges are (visual) representation of the users' **achievements** in the narrative.*

e.g., finishing missions, saving energy (Wh/kWh), 1st place in the leaderboards, ...

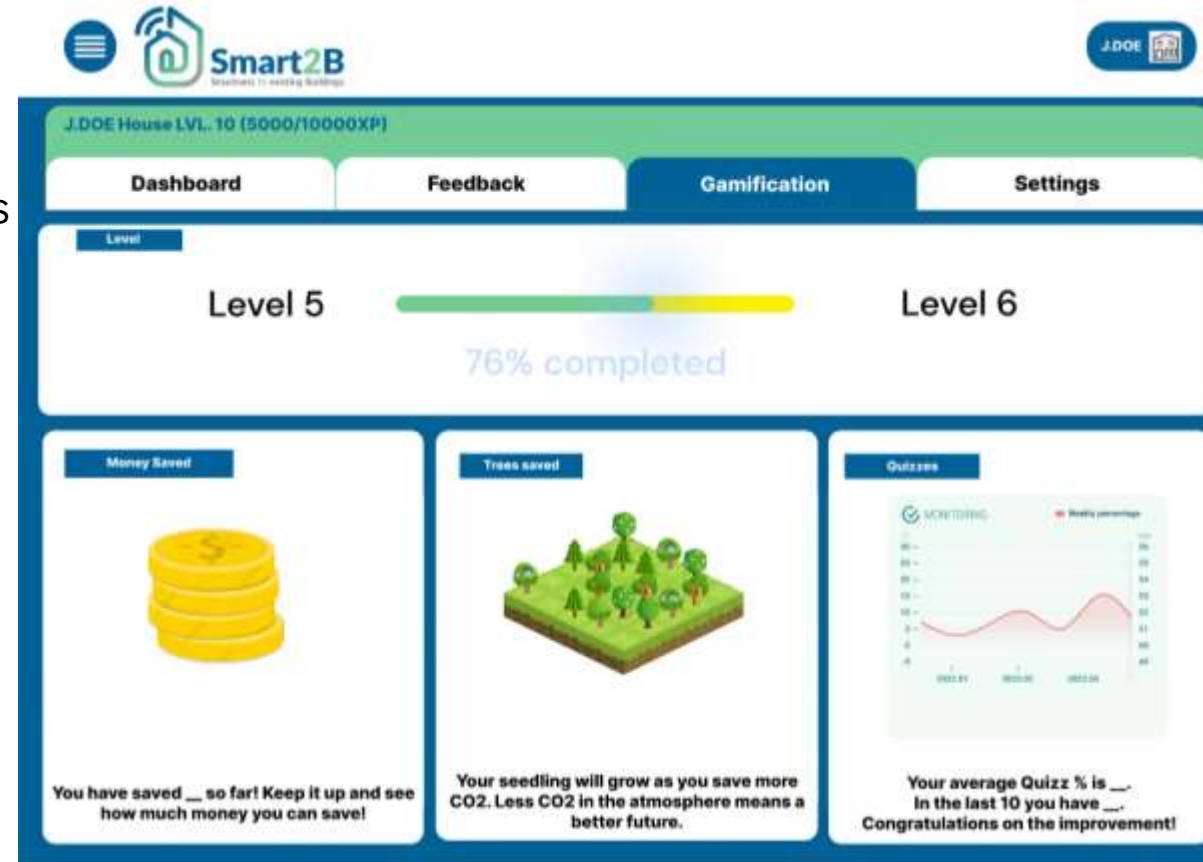


Progress

Information provision, to users according to users' progress

“By graphically displaying the player's performance over a fixed period, they focus on improvements. Motivation theory postulates that this fosters mastery orientation, which is particularly beneficial to learning”⁵

- Updated **performance graphs**
- Personal development - **competition** against oneself
- Highlighting **benefits** (individual & collective)



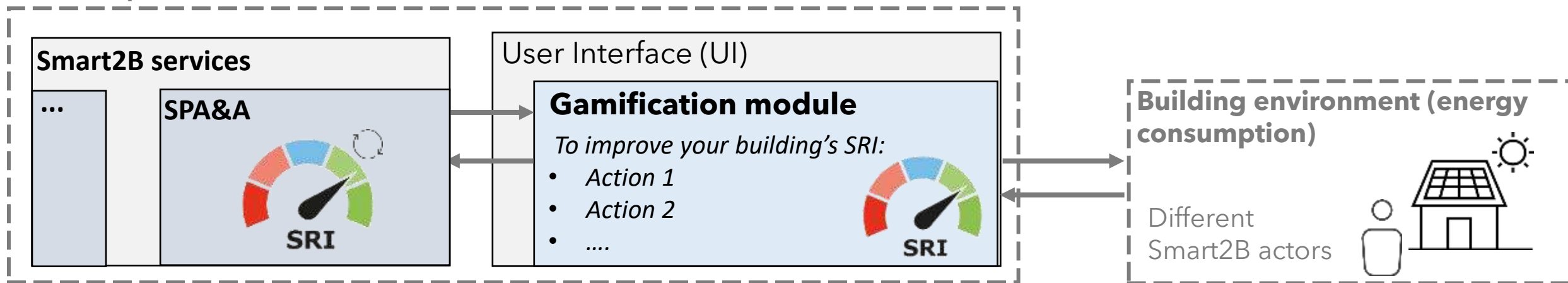


Smart2B Innovation

Smart Performance Assessment and Advisor (SPA&A)

(400 XP)

Smart2B platform environment





Design and implementation

Game elements
(e.g., experience points, tasks)

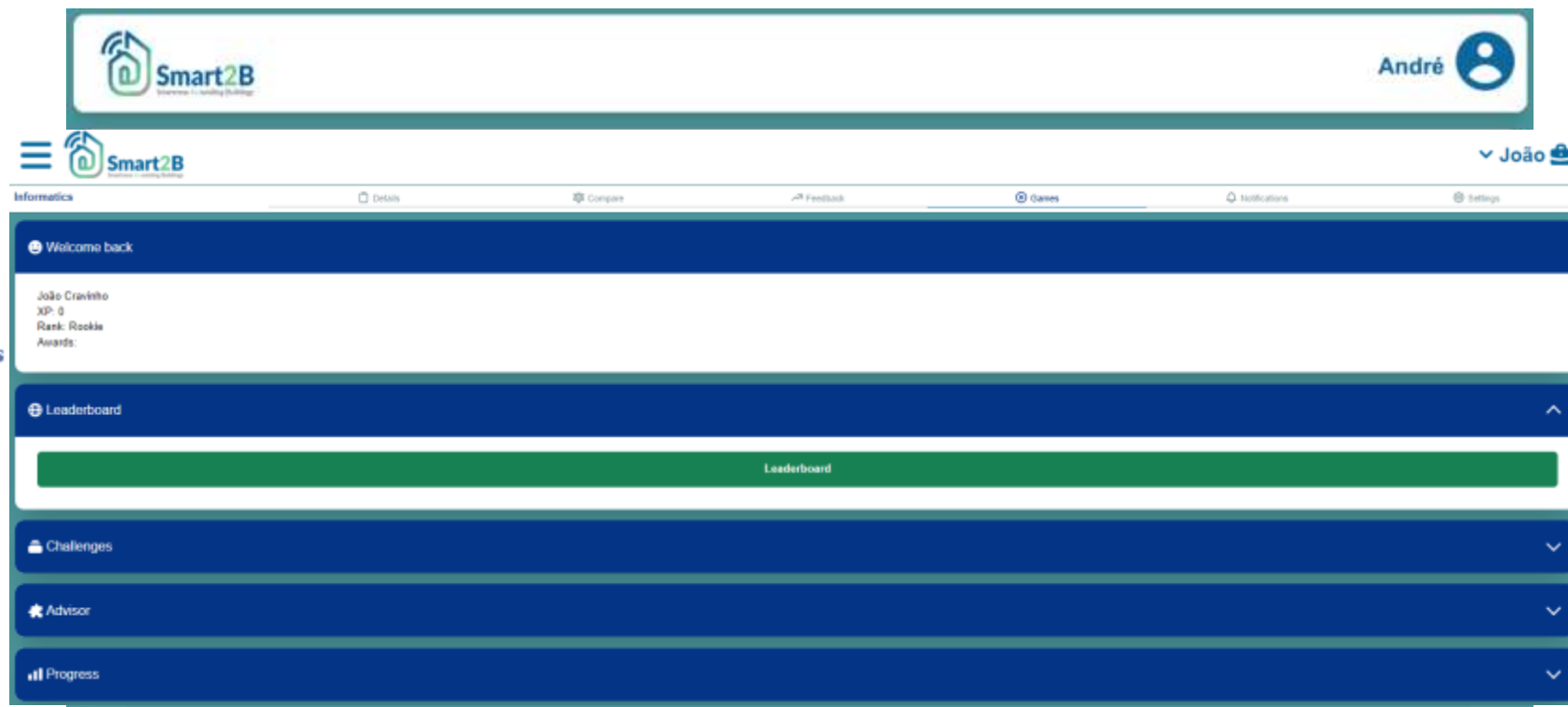
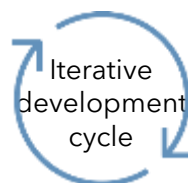


Game mechanisms
(e.g., healthy competition)

Game design
(e.g., challenging narrative)

Game principles
(e.g., positive feedback)

Selected users
test sessions



04

Final remarks & next steps

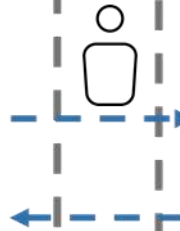




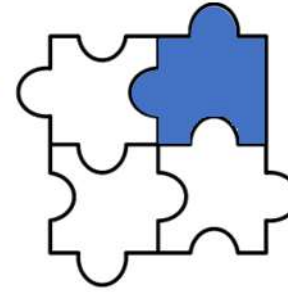
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Residential energy consumption patterns



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Next steps:

- ☐ Further platform **development** (gamification module)
- ☐ Further test with selected users (**user-centered approach**)
- ☐ Platform deployment
- ☐ Detailed description of gamification module development (D5.4)



**Full stack
(front+back)**

November 2022



Smart2B

Smartness to existing Buildings

THANK YOU FOR YOUR TIME

www.smart2b-project.eu



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