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SMART^2 BETA VERSION V1

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D3.3 SMART^2 BETA VERSION V1

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EXECUTIVE SUMMARY

Deliverable D3.3 "Smart² Beta Version v1" outlines the extensive testing phase of the Smart² tool following its conceptual and front-end development. The primary objective of Task 3.3 is to identify and correct technical flaws through thorough testing. This testing involves both alpha and beta testing using specific use cases to ensure the tool's robustness. Emphasis is placed on user interaction, ensuring that users can successfully complete the assessment of a building's smart readiness. This process also provides valuable insights into the tool's scalability, performance, and reliability. Furthermore, the Smart² tool's performance is validated against other applications like IsZEB Certify, which issues SRI Certificates based on existing methodologies, ensuring that Smart² meets industry standards and user expectations.

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LIST OF ACRONYMS AND ABBREVIATIONS

Term	Description
SRI	Smart Readiness Indicator
UI	User Interface

1. Introduction

1.1. Scope and objectives of the deliverable

According to Task 3.3, the scope of Deliverable 3.3 “Smart² Beta Version v1" include the comprehensive refinement and enhancement of the Smart² tool. The primary objectives of this deliverable include:

Validation of Results: Validating the results produced by the Smart² tool by comparing them with the results generated by the IsZEB Certify tool and the EU Excel tool. This comparative analysis aims to ensure that the Smart² tool aligns with established methodologies and industry standards for issuing Smart Readiness Indicator (SRI) Assessments.

User Interface Adjustments: Evaluating and suggesting adjustments to the user interface (UI) to enhance user experience. This includes observing interactions between testers and the tool, identifying any usability issues, and implementing necessary UI improvements to ensure that users can efficiently and successfully complete the assessment of a building's smart readiness.

The overall goal of D3.3 is to ensure that the Smart² tool is technically sound, user-friendly, and capable of delivering accurate and reliable results in line with industry standards. This deliverable will play a crucial role in preparing the Smart² tool for broader deployment and use in real-world scenarios.

1.2. Structure of the Deliverable

The structure of Deliverable 3.3, "Smart² Beta Version v1," is carefully organized to provide a comprehensive overview of the testing and validation process for the Smart² tool.

- **Introduction** section outlines the scope and objectives of the deliverable, explains its structure, and details its relation to other tasks and deliverables within the project.
- **Methodology** section explores the specific use cases utilized for testing, offers an overview of the testing phases including alpha and beta testing, and describes the validation tools employed.
- **Results** section presents the findings from both alpha and beta testing phases, providing detailed insights into the performance and reliability of the Smart² tool.
- **Conclusions** section summarizes the key outcomes, reflecting on the overall effectiveness of the testing process and suggesting potential improvements for future development.

This structured approach ensures a clear and logical flow of information, facilitating a thorough understanding of the deliverable's purpose and findings.

1.3. Relation to other Tasks

Deliverable 3.3, "Smart² Beta Version v1," is closely connected with Task 3.2, which focuses on the backend and frontend development of the Smart² tool. This deliverable builds directly on the outcomes of Task 3.2, using the developed backend and frontend components as the foundation for the extensive testing and validation activities described in Task 3.3. The insights gained from the beta testing phase in D3.3 are crucial for refining these components, ensuring they meet the required standards for performance, scalability, and user experience. The testing executed under Task 3.3 is particularly critical for Task 3.4, "Smart² Release," which focuses on preparing the tool for its final deployment. Additionally, an updated version of this deliverable is scheduled for release before the final deployment of the Smart² tool, ensuring ongoing enhancement and adaptation based on evolving requirements and user feedback throughout the project duration.

2. Methodology

Task 3.3 “Smart² Alpha and Beta Testing” involved a comprehensive testing process, divided into two key phases: alpha testing and beta testing. Each phase was carefully planned and executed to ensure a thorough evaluation of the tool, with the goal of refining its accuracy, reliability, and applicability across different building scenarios. For the validation, specific use cases of buildings were created— 15 for the alpha testing and 35 for the beta testing. The use cases of both test phases can be found in the Appendix section of this Deliverable.

During the alpha testing phase, any deviations or issues identified were documented and sent to Euphyia, the leader of Task 3.2 “Smart² backend and frontend development”. Euphyia then proceeded with the necessary adjustments to the backend and implemented corrections to the front end to enhance user experience. Following these corrections, IsZEB conducted the beta testing phase. This phase involved re-testing the 15 use cases from the alpha testing and testing an additional 35 use cases. The results from the beta testing phase confirmed the tool's improvements, as all use cases were successfully validated, demonstrating complete agreement with the expected outcomes.

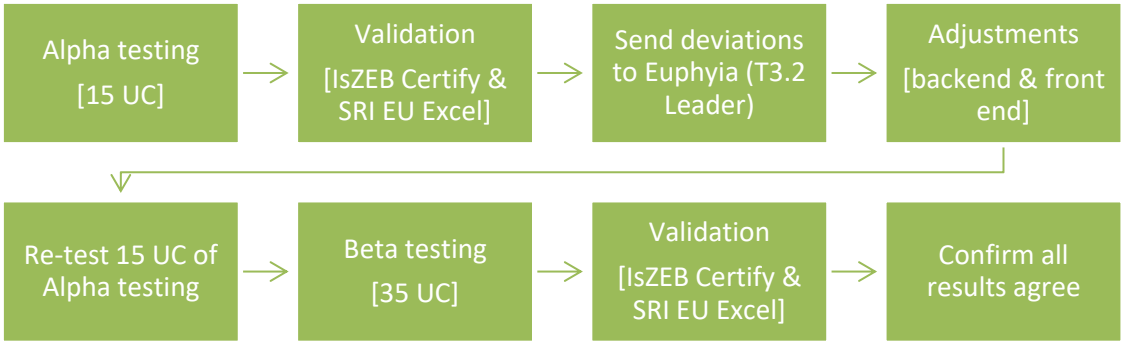


Figure 1 Methodology flowchart

2.1 Use Cases

A critical aspect of both the alpha and beta testing phases was the creation of diverse use cases. These use cases were randomly generated to ensure a comprehensive evaluation of the Smart² tool across various building scenarios. This approach was intentional to avoid any biases and to cover a wide range of variables that could affect the SRI calculations.

The 50 use cases included a mix of residential and non-residential buildings. Specifically, 19 were residential and 31 were non-residential, representing a variety of building types as shown in Figure 2.

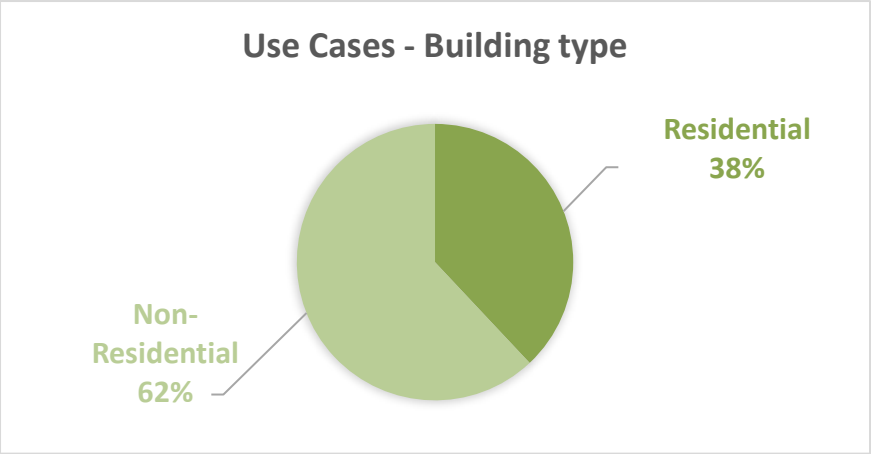


Figure 2. Use cases - Type of buildings

The variables considered in the use cases included also the climate zone of the building (based on the 5 climate zones of the SRI methodology as presented in Figure 3), the useful floor area, the year of construction, and the functionality levels of smart-ready services integrated into the building.

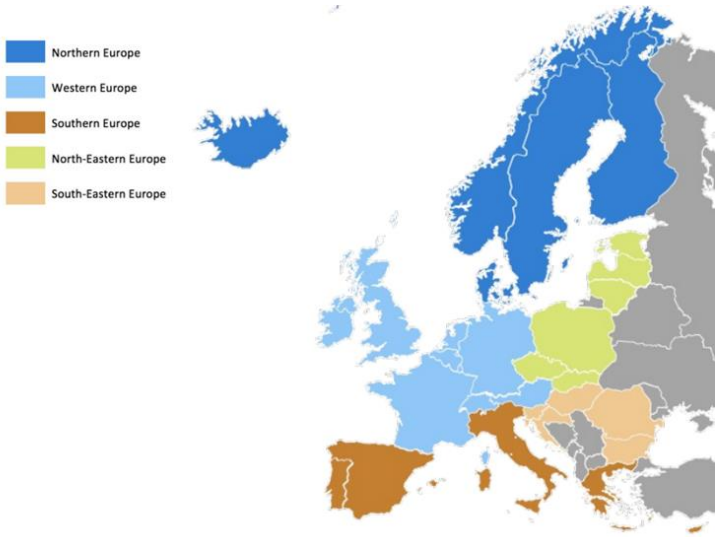


Figure 3. Climate zones SRI

The use cases were distributed equally among the five climate zones and five periods of year of construction, with 20% allocated to each zone and each period, ensuring comprehensive coverage and evaluation. The useful floor area varied widely, with most of the use cases (22) being less than 200 m², reflecting the typical size of residential buildings (Figure 4).

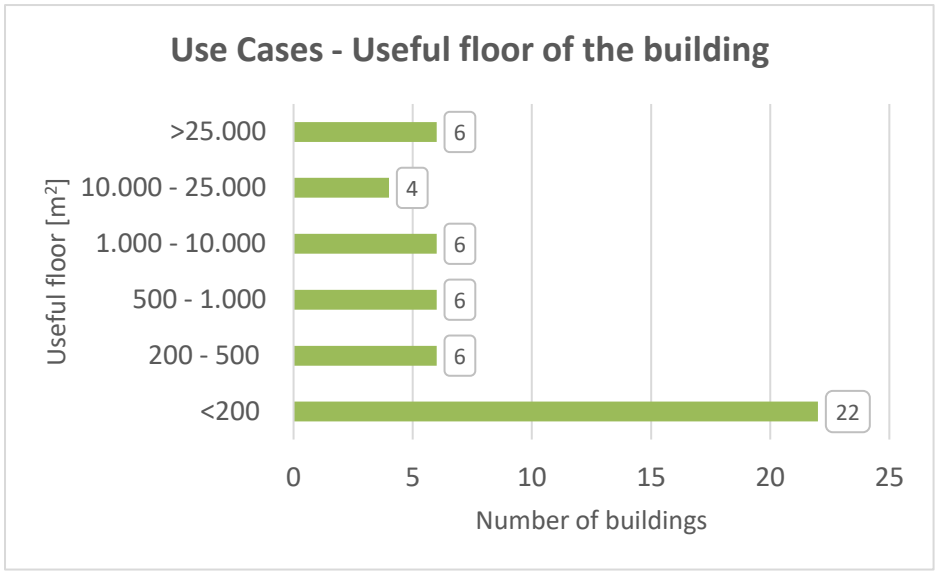


Figure 4 Use cases - useful floor area

To further ensure the effectiveness of the Smart² tool, both Method A and Method B were utilized for calculating the SRI. Method A was used for 60% of the use cases, while Method B was applied to 40% (Figure 5). By employing both methods, the testing ensured that the tool's calculations were comprehensive and could cater to different needs and regulatory requirements. Additionally, various types within the technical domains were tested: '1' indicates the domain is present, '2' indicates the domain is absent but mandatory, and '0' indicates the domain is absent and not mandatory.

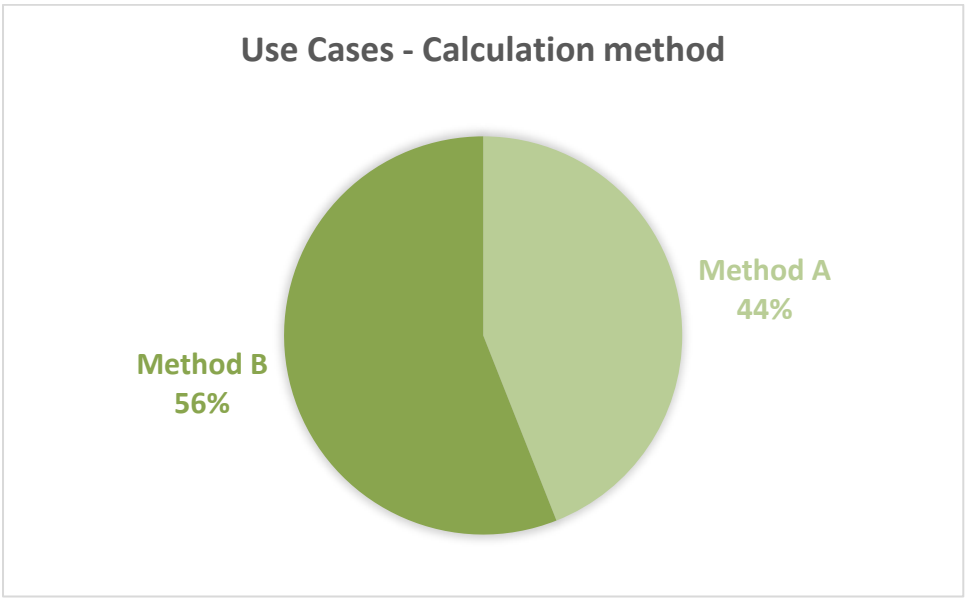


Figure 5. Calculation method

By incorporating such a wide array of factors, the testing was able to simulate real-world conditions more accurately. This holistic approach ensured that the Smart² tool could handle various scenarios, making it a reliable and flexible instrument.

2.2 Overview of the Testing Phase

2.2.1 Validation tools

To ensure the accuracy and reliability of the Smart² tool, two primary validation tools were employed during both the alpha and beta testing phases: IsZEB Certify and the SRI EU Excel tool. For the validation of the Smart² tool, the latest SRI calculation methodology version 4.5 was used for both IsZEB Certify and the SRI EU Excel tool, ensuring that the tool's outputs are accurate and consistent with the most current standards.

IsZEB Certify is an innovative digital platform that, among other things, can issue SRI assessments based on existing SRI calculation methodologies. Its reliability and proven track record in the industry made it an ideal choice for validating the performance of the Smart² tool.

SRI EU Excel Tool is a calculation spreadsheet provided free by the European Commission to facilitate the assessment of the SRI. It offers a comprehensive framework for evaluating the smart readiness of buildings, ensuring that the Smart² tool's outputs are accurate and consistent with established standards.

Using these two validation tools allowed for a thorough cross-comparison of results, ensuring that the Smart² tool met high standards of accuracy and reliability. This dual validation approach helped identify discrepancies and areas for improvement, contributing to the overall refinement of the Smart² tool.

2.2.2 Alpha testing

The alpha testing phase marked the initial evaluation of the Smart² tool. This phase was essential for identifying preliminary issues and collecting data to inform necessary adjustments. The tools utilized for validation during this phase were IsZEB Certify and the EU Excel tool, both selected for their established reliability in evaluating the SRI.

The testing process involved conducting a series of 15 use cases aimed at thoroughly examining the initial version of the Smart² tool. Each test generated detailed results, highlighting both the performance and any deviations observed. These deviations were critical as they pinpointed areas where the tool did not perform as expected. The documented results and deviations for each use case, including the PDF outputs of the Smart² tool and IsZEB Certify, the Excel files from the SRI EU Excel spreadsheet, and a summary Excel file with the results for each tool and the deviations regarding the SRI score, the 3 key functionalities, the 9 technical domains, and the 7 impact criteria, were then forwarded to the leader of Task 3.2, Euphyia.

The summary Excel file (a part of it is presented in Figure 6) was particularly important because it consolidated all the key data and deviations in a single, comprehensive document. This allowed Euphyia to quickly identify discrepancies and patterns that pointed to specific issues or bugs in the coding. By having a clear overview of where the Smart² tool's outputs differed from the established benchmarks provided by the IsZEB Certify and SRI EU Excel tools, Euphyia could more efficiently pinpoint the exact areas in the backend and frontend development that needed adjustments. This streamlined the debugging process and ensured that targeted corrections could be made to enhance the tool's accuracy and functionality.

	UC1				UC2				UC3				UC4			
Tool	IsZEB Certify	EU	Smart square	Difference	IsZEB Certify	EU	Smart square	Difference	IsZEB Certify	EU	Smart square	Difference	IsZEB Certify	EU	Smart square	Difference
SRI score	**50.94**	**50.9**	**51**	**0.12%**	**56.85**	**56.8**	**52**	**-9.33%**	68.86	68.9	**error**		**46.94**	**46.9**	**42**	**-11.8%**
Optimise energy efficiency and overall in-use performance	43.11	43.1	43	-0.26%	46.23	46.2	53	12.77%	69.73	69.7	**error**		37.58	37.6	44	14.6%
Adapt their operation to the needs of the occupant	59.9	59.9	60	0.17%	60.82	60.8	63	3.46%	60.83	60.8	**error**		46.63	46.6	48	2.9%
Adapt to signals from the grid (energy flexibility)	49.83	49.8	50	0.34%	63.49	63.5	41	-54.85%	76	76	**error**		56.6	56.6	34	-66.5%
Techical Domains																
Heating	43.61	43.6	43	-1.42%	51.25	51.3	46	**-11%**	75.28	75.3	**error**		36.67	36.7	31	**-18%**
Cooling	79.56	79.6	80	0.55%	53.77	53.8	54	0%	41.37	41.4	**error**		36.21	36.2	36	-1%
DHW	46.67	46.7	47	0.70%	72	72	72	0%	64.67	64.7	**error**		46.67	46.7	47	1%
Ventilation	50	50	50	0.00%	27.08	27.1	27	0%	50	50	**error**		72.92	72.9	73	0%
Lighting	0	0	0		100	100	100	0%	0	0	**error**		0	0	0	
DBE	0	0	0		0	0	0		0	0	**error**		0	0	0	
Electricity	42.44	42.4	43	1.30%	54.89	54.9	55	0%	50	50	**error**		48.67	48.7	49	1%
EVC	0	0	0		0	0	0		0	0	**error**		0	0	0	
MC	40.71	40.7	41	0.71%	80.71	80.7	81	0%	100	100	**error**		60.95	61	61	0%
Impact criteria																
Energy efficiency	49.24	49.2	49	-0.49%	48.53	48.5	62	22%	78.93	78.9	**error**		36.36	36.4	50	27%
Maintenance & Fault prediction	36.97	37	37	0.08%	43.93	43.9	44	0%	60.52	60.5	**error**		38.79	38.8	39	1%
Comfort	66.67	66.7	67	0.49%	50	50	56	11%	55.56	55.6	**error**		38.89	38.9	44	12%
Convenience	55	55	55	0.00%	52.5	52.5	55	5%	67.5	67.5	**error**		35	35	37	5%
Health,well being and accesibility	63.64	63.6	64	0.56%	63.64	63.6	64	1%	54.55	54.5	**error**		54.55	54.5	55	1%
Information to occupants	54.29	54.3	54	-0.54%	77.14	77.1	77	0%	65.71	65.7	**error**		58.1	58.1	58	0%
Energ flexibility and storage	49.83	49.8	50	0.34%	63.49	63.5	41	-55%	76.03	76	**error**		56.6	56.6	34	-66%

Figure 6 Part of the Summary excel with the results of alpha testing and deviations

Euphyia played a pivotal role in this phase, utilizing the feedback to make targeted adjustments to the Smart² tool. This iterative process of testing, feedback, and adjustment was fundamental to improving the tool's accuracy and functionality. The continuous loop of testing and refining ensured that the Smart² tool evolved to meet the necessary standards and user requirements before moving on to the beta testing phase.

2.2.3 Beta testing

Following the adjustments made during the alpha testing phase, the beta testing phase was initiated. This phase was designed to validate the corrections and ensure that the Smart² tool could perform reliably under a broader range of scenarios. The beta testing involved a more extensive series of 35 new use case tests, in addition to retesting the original 15 use cases from the alpha phase. This comprehensive approach ensured that the adjustments were effective and that the tool's performance was consistent across both new and previously tested scenarios.

During the beta testing phase, the corrected version of the Smart² tool was evaluated once again using the IsZEB Certify and SRI EU Excel tools. These tools provided a robust framework for cross-validation, ensuring that the Smart² tool's outputs were aligned with established benchmarks and industry standards. The beta testing aimed not only to confirm the accuracy of the adjustments but also to assess the tool's overall performance, reliability, and consistency under diverse conditions.

The results from the beta testing phase, as presented in Figure 7, demonstrated complete agreement between the Smart² tool, IsZEB Certify, and the SRI EU Excel tools. This accordance was a significant milestone, indicating that the adjustments had successfully addressed the issues identified in the alpha phase. The Smart² tool was now functioning as intended, showcasing improved accuracy and reliability. The successful beta testing phase underscored the tool's robustness and its capability to handle a wide array of building scenarios, making it a reliable and versatile instrument for assessing the SRI of buildings. This validation not only reinforced the tool's credibility but also paved the way for its broader application and deployment in real-world settings.

	UC64				UC70				UC71			
Tool	IsZEB Certify	EU	Smart square	Difference	IsZEB Certify	EU	Smart square	Difference	IsZEB Certify	EU	Smart square	Difference
SRI score	**45.57%**	**45.57%**	**45.57%**	**0.00%**	**54.07%**	**54.07%**	**54.07%**	**0.00%**	**56.83%**	**56.83%**	**56.83%**	**0.00%**
Optimise energy efficiency and overall in-use performance	41.47%	41.47%	41.47%	0.00%	48.08%	48.08%	48.08%	0.00%	52.09%	52.09%	52.09%	0.00%
Adapt their operation to the needs of the occupant	44.08%	44.08%	44.08%	0.00%	61.93%	61.93%	61.93%	0.00%	59.65%	59.65%	59.65%	0.00%
Adapt to signals from the grid (energy flexibility)	51.17%	51.17%	51.17%	0.00%	52.21%	52.21%	52.21%	0.00%	58.76%	58.76%	58.76%	0.00%
Techical Domains												
Heating	50.00%	50.00%	50.00%	0.00%	56.71%	56.71%	56.71%	0.00%	52.46%	52.46%	52.46%	0.00%
Cooling	50.42%	50.42%	50.42%	0.00%	55.34%	55.34%	55.34%	0.00%	57.23%	57.23%	57.23%	0.00%
DHW	0.00%	0.00%	0.00%	0.00%	43.51%	43.51%	43.51%	0.00%	35.50%	35.50%	35.50%	0.00%
Ventilation	57.07%	57.07%	57.07%	0.00%	48.15%	48.15%	48.15%	0.00%	77.98%	77.98%	77.98%	0.00%
Lighting	57.33%	57.33%	57.33%	0.00%	93.33%	93.33%	93.33%	0.00%	57.33%	57.33%	57.33%	0.00%
DBE	35.42%	35.42%	35.42%	0.00%	92.29%	92.29%	92.29%	0.00%	75.63%	75.63%	75.63%	0.00%
Electricity	58.40%	58.40%	58.40%	0.00%	34.81%	34.81%	34.81%	0.00%	40.56%	40.56%	40.56%	0.00%
EVC	-19.44%	-19.44%	-19.44%	0.00%	41.67%	41.67%	41.67%	0.00%	75.00%	75.00%	75.00%	0.00%
MC	50.93%	50.93%	50.93%	0.00%	43.67%	43.67%	43.67%	0.00%	49.87%	49.87%	49.87%	0.00%
Impact criteria												
Energy efficiency	52.89%	52.89%	52.89%	0.00%	63.93%	63.93%	63.93%	0.00%	63.57%	63.57%	63.57%	0.00%
Maintenance & Fault prediction	30.04%	30.04%	30.04%	0.00%	32.24%	32.24%	32.24%	0.00%	40.60%	40.60%	40.60%	0.00%
Comfort	46.45%	46.45%	46.45%	0.00%	84.15%	84.15%	84.15%	0.00%	63.93%	63.93%	63.93%	0.00%
Convenience	35.87%	35.87%	35.87%	0.00%	65.66%	65.66%	65.66%	0.00%	58.59%	58.59%	58.59%	0.00%
Health,well being and accesibility	39.52%	39.52%	39.52%	0.00%	67.74%	67.74%	67.74%	0.00%	66.94%	66.94%	66.94%	0.00%
Information to occupants	54.49%	54.49%	54.49%	0.00%	30.17%	30.17%	30.17%	0.00%	49.16%	49.16%	49.16%	0.00%
Energy flexibility and storage	51.17%	51.17%	51.17%	0.00%	52.21%	52.21%	52.21%	0.00%	58.76%	58.76%	58.76%	0.00%

Figure 7. Part of the Summary excel with the results of beta testing and deviations

3. Conclusions

Deliverable 3.3, "Smart² Beta Version v1," has successfully met the scope and objectives outlined in Task 3.3, marking a significant milestone in the development and refinement of the Smart² tool. Through a comprehensive testing process divided into alpha and beta phases, the tool has undergone thorough evaluation to ensure its accuracy, reliability, and applicability across different building scenarios.

During the alpha testing phase, 15 specific use cases were created and tested. Any deviations or issues identified were documented and sent to Euphyia, the leader of Task 3.2 “Smart² backend and frontend development.” Euphyia implemented necessary adjustments and corrections, significantly enhancing both the backend functionality and front-end user experience. The subsequent beta testing phase, conducted by IsZEB, involved re-testing the initial 15 use cases and an additional 35 use cases. The results from the beta testing confirmed the tool's improvements, as all use cases were successfully validated, demonstrating complete agreement with the expected outcomes.

Overall, the successful execution of Deliverable 3.3 has ensured that the Smart² tool is technically sound, user-friendly, and capable of delivering accurate and reliable results in line with established methodologies for SRI assessment. The enhancements made to the user interface have improved usability, enabling users to efficiently complete SRI audits. This deliverable plays a crucial role in preparing the Smart² tool for broader deployment and real-world application, paving the way for its successful adoption in the market. Additionally, there will be an updated version of this deliverable, Deliverable D3.7 – Smart² Beta Version v2, scheduled for release in M36, which will further refine and enhance the tool based on ongoing feedback and advancements.

APPENDIX 1

Alpha testing – 15 Use Cases

Use Cases	UC1	UC2	UC3	UC4	UC5	UC6	UC7	UC8	UC9	UC58	UC59	UC60	UC61	UC68	UC79
Building Information															
Building type [R, NR]	R	R	R	R	R	R	R	R	R	NR	NR	NR	NR	NR	NR
Location [W, SE, NE,N, S]	W	W	W	W	W	W	SE	SE	SE	W	W	SE	SE	SE	NE
seful floor area of the building	60	60	60	60	60	60	60	60	60	30000	30000	300	300	30000	30000
Year of Construction	1970	1970	1970	1970	1970	1970	2000	2000	2000	2020	2020	1970	1970	2000	NYC
Method [A/B]	A	A	A	A	A	A	A	A	A	B	B	B	B	B	B
Domains [1,2,0]															
Heating	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Domestic hot water	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1
Cooling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Ventilation	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1
Lighting	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Dynamic building envelope	0	0	0	0	1	1	0	0	0	1	1	1	1	1	1
Electricity	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Electric vehicle charging	0	0	0	0	1	1	0	0	0	1	1	1	1	1	1
Monitoring and control	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Services (Mε bold A/B)															
H-1a [0-4]	1	1	3	1	1	2	3	4	1	0	0	2	1	4	3
H-1b [0-3]										0	0	1	0	1	3
H-1c [0-2]	0	2	1	2	1	2	2	1	2	0	1	0	2	0	1
H-1d [0-4]										2	1	4	2	4	3
H-1f [0-3]										2	1	1	0	2	2
H-2a [0-2]	2	1	2	1	1	1	1	0	0	2	0	2	0	0	1
H-2b [0-3]	3	1	3	1	0	2	0	3	3	0	2	1	0	3	0
H-2d [0-4]										0	2	3	3	4	3
H-3 [0-4]	0	3	1	0	3	0	1	2	0	1	1	3	1	3	3
H-4 [0-4]										2	0	1	2	1	3
DHW-1a [0-2]	1	2	1	1	1	2	2	2	0	2		0	0	1	0
DHW-1b [0-2]	1	0	2	1	2	1	0	2	0	0		0	0	2	1
DHW-1d [0-3]										1		0	0	1	3
DHW-2b [0-4]										1		0	2	1	2
DHW-3 [0-4]	1	4	1	1	3	4	4	3	4	3		1	2	1	4
C-1a [0-4]	3	2	0	0	2	0	3	2	2	2	4	3	3	3	2
C-1b [0-3]										1	3	3	3	3	2
C-1c [0-2]										2	1	0	0	1	0
C-1d [0-4]										2	0	4	2	3	4
C-1f [0-2]										1	2	1	1	2	2
C-1g [0-3]										0	1	0	3	1	3
C-2a [0-3]	1	0	0	2	2	3	1	2	1	3	3	2	0	0	3
C-2b [0-4]										1	0	3	2	0	3
C-3 [0-4]	4	2	3	4	4	4	3	1	3	1	3	0	1	4	2
C-4 [0-4]	3	4	3	0	0	4	4	1	1	0	1	2	0	4	0
V-1a [0-4]	2	0	2	2	0	4	4	1	1	2	1	2		3	1
V-1c [0-4]										2	3	0		2	1
V-2c [0-2]										1	0	1		2	1
V-2d [0-3]										1	3	3		2	0
V-3 [0-3]										0	3	1		1	0
V-6 [0-3]	1	2	1	3	1	2	1	2	3	0	3	3		0	1
L-1a [0-3]	0	3	0	0	0	3	2	2	0	0	3	2	1	0	3
L-2 [0-4]										1	1	4	1	0	0
DE-1 [0-4]					4	3				2	2	2	3	1	0
DE-2 [0-3]										3	2	0	3	1	1
DE-4 [0-4]					2	0				3	3	0	1	3	0
E-2 [0-4]	0	2	1	2	0	4	2	0	0	3	0	1	1	3	2
E-3 [0-4]	2	3	1	2	1	0	1	4	0	3	3	2	2	1	1
E-4 [0-3]										0	3	0	3	1	0
E-5 [0-2]										1	1	0	2	1	2
E-8 [0-3]										0	0	0	0	3	2
E-11 [0-4]	3	1	2	1	2	4	4	3	3	0	2	4	3	3	0
E-12 [0-4]	1	2	3	0	2	0	2	1	4	3	1	3	3	2	3
EV-15 [0-4]					4	3				0	3	3	0	3	0
EV-16 [0-2]					0	0				0	1	0	2	2	1
EV-17 [0-2]					1	1				1	0	1	1	0	1
MC-3 [0-3]										3	3	3	0	0	0
MC-4 [0-3]										2	1	2	2	2	0
MC-9 [0-2]										0	2	1	2	1	2
MC-13 [0-3]	3	3	3	3	0	0	1	3	0	3	1	2	0	3	1
MC-25 [0-2]	0	2	2	1	0	1	2	0	1	2	1	0	2	0	2
MC-28 [0-2]										2	1	2	1	2	2
MC-29 [0-4]										3	0	3	1	2	0
MC-30 [0-3]	1	0	3	0	1	2	2	2	0	2	0	3	3	0	0

Beta testing – 35 Use Cases

Use Cases	UC10	UC11	UC12	UC13	UC14	UC15	UC30	UC31	UC32	UC33	UC34	UC35	UC36	UC56	UC57	UC64	UC70
Building Information																	
Building type [R, NR]	R	R	R	R	R	R	R	R	R	R	NR	NR	NR	NR	NR	NR	NR
Location [W, SE, NE,N, S]	SE	SE	SE	NE	NE	NE	S	S	S	S	W	N	NE	S	W	SE	NE
Useful floor area of the building	60	60	60	60	60	60	100	100	100	100	50	50	50	1500	1500	600	300
Year of Construction	2000	2000	2000	2000	2000	2020	NYC	NYC	NYC	NYC	NYC	NYC	NYC	1950	2000	2020	2020
Method [A/B]	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B	B
Domains [1,2,0]																	
Heating	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Domestic hot water	1	1	1	1	0	1	2	2	2	2	0	0	0	1	1	0	1
Cooling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Ventilation	1	1	1	1	1	1	1	1	1	1	2	2	2	1	1	1	1
Lighting	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Dynamic building envelope	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1
Electricity	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Electric vehicle charging	0	1	1	0	0	0	1	1	1	1	2	2	2	1	1	1	1
Monitoring and control	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Services (Mc bold A/B)																	
H-1a [0-4]	2	2	1	0	1	4	4	3	2	3	4	1	3	3	1	3	2
H-1b [0-3]														1	2	2	3
H-1c [0-2]	2	0	2	1	1	0	1	0	1	2	2	1	0	1	0	1	2
H-1d [0-4]														4	0	0	0
H-1f [0-3]														1	1	0	3
H-2a [0-2]	0	0	2	2	1	1	2	0	2	2	2	1	1	2	0	1	2
H-2b [0-3]	2	1	2	0	3	2	0	1	2	3	2	0	3	0	0	2	1
H-2d [0-4]														3	3	4	0
H-3 [0-4]	2	2	4	0	3	3	3	2	2	2	1	1	4	3	4	2	0
H-4 [0-4]														0	3	1	4
DHW-1a [0-2]	1	0	1	0		1								1	0	2	2
DHW-1b [0-2]	0	1	2	1		0								1	2	0	2
DHW-1d [0-3]														0	3	0	1
DHW-2b [0-4]														1	3	4	3
DHW-3 [0-4]	3	3	2	2		2								1	0	2	0
C-1a [0-4]	0	2	2	0	0	3	4	2	0	3	1	4	1	3	4	0	3
C-1b [0-3]														0	1	2	3
C-1c [0-2]														1	1	2	2
C-1d [0-4]														0	3	1	2
C-1f [0-2]														2	2	2	2
C-1g [0-3]														2	0	1	3
C-2a [0-3]	3	2	1	3	2	0	0	3	2	3	0	0	3	2	1	1	2
C-2b [0-4]														2	4	3	3
C-3 [0-4]	2	1	3	1	3	0	0	1	4	1	1	4	3	1	1	3	0
C-4 [0-4]	2	0	3	1	1	2	1	4	1	3	3	0	4	4	2	3	0
V-1a [0-4]	1	1	2	1	2	0	2	1	0	2				2	0	0	3
V-1c [0-4]														2	4	3	4
V-2c [0-2]														0	0	0	2
V-2d [0-3]														0	3	0	1
V-3 [0-3]														0	3	1	1
V-6 [0-3]	3	2	0	1	0	2	3	2	1	0				0	0	3	0
L-1a [0-3]	3	1	3	3	3	3	0	3	0	1	0	3	1	3	0	2	2
L-2 [0-4]														3	2	2	4
DE-1 [0-4]	2	1	1				4	3	1	3	3	0	2	3	1	0	4
DE-2 [0-3]														2	3	1	1
DE-4 [0-4]	3	0	3				2	3	4	1	1	2	0	0	1	2	4
E-2 [0-4]	1	3	1	1	4	4	2	3	1	3	4	4	2	3	1	4	1
E-3 [0-4]	3	3	4	3	3	0	3	0	0	3	0	0	4	4	4	3	1
E-4 [0-3]														0	0	0	1
E-5 [0-2]														1	0	0	0
E-8 [0-3]														2	0	3	1
E-11 [0-4]	3	1	2	3	0	0	0	0	0	1	3	4	2	0	3	3	2
E-12 [0-4]	1	3	1	4	2	3	4	3	2	2	3	1	1	3	4	3	0
EV-15 [0-4]		2	0				2	2	1	1				4	4	0	2
EV-16 [0-2]		0	0				0	0	2	2				1	1	0	1
EV-17 [0-2]		0	1				0	1	2	0				1	1	1	1
MC-3 [0-3]														1	0	3	1
MC-4 [0-3]														2	3	0	0
MC-9 [0-2]														0	1	1	1
MC-13 [0-3]	2	2	1	2	1	1	1	2	2	0	2	3	1	2	3	0	2
MC-25 [0-2]	2	0	0	2	0	2	1	0	2	1	2	2	0	1	0	1	1
MC-28 [0-2]														0	1	2	0
MC-29 [0-4]														2	0	1	4
MC-30 [0-3]	0	1	0	3	0	1	1	3	2	3	0	2	0	0	1	0	1

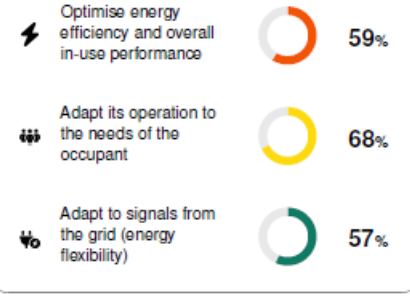
Use Cases	UC71	UC72	UC73	UC74	UC80	UC81	UC82	UC83	UC84	UC85	UC86	UC87	UC88	UC96	UC97	UC98	UC99	UC100
Building Information																		
Building type [R, NR]	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Location [W, SE, NE,N, S]	NE	NE	NE	NE	N	N	N	N	N	N	N	N	N	S	S	S	S	S
Useful floor area of the building	300	300	600	600	20000	20000	300	600	600	600	1500	1500	30000	1500	1500	30000	20000	20000
Year of Construction	2020	1970	1970	2020	1950	1950	1950	1950	2020	2020	2020	1950	1950	1950	NYC	1950	1950	NYC
Method [A/B]	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Domains [1,2,0]																		
Heating	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Domestic hot water	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
Cooling	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Ventilation	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1
Lighting	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Dynamic building envelope	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1
Electricity	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Electric vehicle charging	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
Monitoring and control	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Services (Mε bold A/B)																		
H-1a [0-4]	0	3	3	4	0	0	2	0	3	1	1	1	2	3	2	3	2	1
H-1b [0-3]	2	3	0	2	2	2	1	3	0	3	3	0	3	1	2	1	0	2
H-1c [0-2]	0	2	0	1	2	1	1	1	2	1	2	1	0	1	2	1	1	2
H-1d [0-4]	2	1	3	4	3	4	3	0	3	1	4	2	1	3	2	1	1	4
H-1f [0-3]	3	2	0	0	3	2	2	2	2	3	1	0	0	0	2	2	0	2
H-2a [0-2]	2	1	2	1	2	0	0	0	1	0	2	1	0	0	0	2	1	0
H-2b [0-3]	3	1	1	2	3	3	3	0	3	3	0	2	3	3	0	2	0	0
H-2d [0-4]	4	1	2	3	1	0	2	2	0	3	0	4	2	2	1	4	1	0
H-3 [0-4]	3	4	2	1	4	3	4	1	0	0	4	4	2	1	0	1	2	3
H-4 [0-4]	0	2	2	3	2	3	0	3	2	3	1	4	0	4	1	0	4	0
DHW-1a [0-2]	0	0	1	1	2	2	0	2	0	0	2	2	0					
DHW-1b [0-2]	1	1	2	1	1	2	0	2	0	1	2	1	0					
DHW-1d [0-3]	2	1	2	1	1	1	1	2	1	1	3	2	3					
DHW-2b [0-4]	0	0	4	4	2	2	2	3	3	0	4	0	1					
DHW-3 [0-4]	2	0	4	2	0	0	4	1	0	3	1	1	2					
C-1a [0-4]	4	4	2	4	4	1	4	3	4	4	4	1	1	1	2	3	2	3
C-1b [0-3]	0	2	0	2	2	3	2	0	0	0	3	1	2	0	3	3	0	1
C-1c [0-2]	0	2	2	1	2	0	1	2	2	2	0	2	1	1	2	2	2	1
C-1d [0-4]	0	4	0	4	0	3	3	2	3	4	2	1	2	3	1	1	3	2
C-1f [0-2]	2	1	0	2	2	0	1	2	0	2	2	0	1	2	2	1	2	1
C-1g [0-3]	2	0	2	2	3	0	3	0	0	1	3	3	3	0	2	1	3	3
C-2a [0-3]	3	3	3	2	3	2	3	1	3	2	2	0	3	1	3	1	2	0
C-2b [0-4]	4	0	4	3	1	4	1	3	2	3	2	2	1	2	2	2	0	3
C-3 [0-4]	1	0	1	4	3	4	4	1	0	1	4	3	1	1	0	2	0	3
C-4 [0-4]	2	1	2	2	4	3	0	2	3	4	0	0	3	1	4	0	2	3
V-1a [0-4]	4	3	1	1	3	1	1	2	0	1	1	4	3			0	0	4
V-1c [0-4]	4	3	1	3	1	2	1	1	4	2	3	3	3			4	3	1
V-2c [0-2]	2	0	0	2	1	1	2	0	1	1	2	1	0			0	0	1
V-2d [0-3]	2	3	0	1	1	1	0	3	0	0	2	2	0			1	3	3
V-3 [0-3]	1	3	2	0	3	1	1	0	3	3	3	3	3			1	2	2
V-6 [0-3]	2	2	1	3	0	0	0	0	3	0	0	3	2			3	2	2
L-1a [0-3]	2	3	0	2	3	0	3	1	1	1	3	0	3	2	0	3	3	0
L-2 [0-4]	2	3	1	3	2	4	4	2	1	1	1	1	2	2	4	1	0	1
DE-1 [0-4]	3	3	0	2	4	3	2	4	0	3	0	1	2		3	2	4	0
DE-2 [0-3]	3	0	3	3	3	1	2	1	0	1	3	1	0		2	2	1	1
DE-4 [0-4]	2	1	0	0	4	0	2	1	2	2	4	4	4		1	2	4	4
E-2 [0-4]	2	4	2	3	1	3	0	0	1	2	1	4	1	2	1	2	4	2
E-3 [0-4]	1	0	4	1	0	0	0	3	1	0	1	4	1	1	0	2	4	1
E-4 [0-3]	1	1	3	2	3	0	1	2	1	0	3	3	3	0	2	3	3	3
E-5 [0-2]	1	0	2	0	1	0	1	2	2	0	1	1	1	1	2	1	2	0
E-8 [0-3]	3	3	0	0	0	1	2	3	0	3	3	0	2	2	1	0	3	3
E-11 [0-4]	0	1	2	4	1	4	4	4	3	3	3	2	0	2	3	4	2	1
E-12 [0-4]	1	3	0	4	4	0	4	0	2	2	0	0	0	0	4	1	1	3
EV-15 [0-4]	2	3	2	1	0	1	4	4	2	3	2	2	1	1	1	4	0	
EV-16 [0-2]	2	2	2	0	0	2	1	0	0	0	0	0	0	1	0	0	1	
EV-17 [0-2]	1	2	1	1	2	2	2	0	0	1	1	2	1	1	0	2	0	
MC-3 [0-3]	1	2	1	0	2	1	3	1	2	1	2	1	1	3	0	0	2	1
MC-4 [0-3]	3	3	3	0	1	3	3	3	1	2	1	3	2	2	2	0	1	0
MC-9 [0-2]	0	0	1	1	2	0	0	2	2	1	2	2	2	1	0	1	0	2
MC-13 [0-3]	1	1	0	1	2	0	2	3	0	3	0	3	0	0	1	0	1	2
MC-25 [0-2]	1	1	1	0	1	0	0	2	2	2	2	2	0	1	2	1	2	0
MC-28 [0-2]	0	1	0	2	1	2	0	1	1	1	0	0	0	0	0	2	1	0
MC-29 [0-4]	3	3	3	0	2	1	0	3	0	1	4	1	4	2	0	1	3	2
MC-30 [0-3]	3	3	0	0	0	3	1	1	1	2	3	0	0	1	1	3	0	2

SRI Assessment result of UC8 - SmartSquare tool

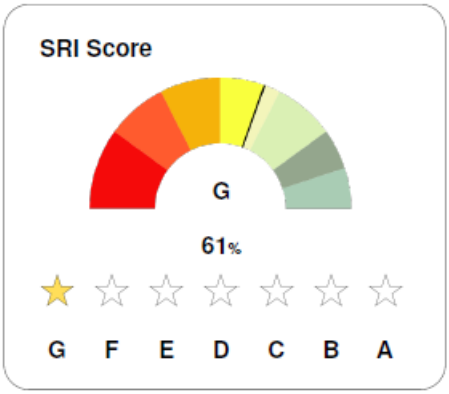
SMART READINESS INDICATOR - ASSESSMENT

Building ID	Date of Assessment	Assesor Name	Building Type
UC8	29-04-2024	Pinelopi Valiouli	residential
Building Usage	**Location**	**Net Floor Area**	**Year Of Construction**
residential - single-family house	Cyprus	<200 m2	1990-2010

Aggregated Scores



SRI Score



	Energy Efficiency	Maintenance & Fault Prediction	Comfort	Convenience	Health & Well-being	Information to Occupants	Energy Flexibility & Storage	SRI
Total	67%	51%	67%	65%	73%	66%	57%	61 %
Heating	88%	50%	83%	100%	100%	67%	60 %	
DHW	100%	50%	0%	80%	0%	100%	100 %	
Cooling	62%	25%	57%	43%	67%	33%	17 %	
Ventilation	33%	50%	33%	33%	67%	67%	0 %	
Lighting	67%	0%	100%	100%	0%	0%	0 %	
DE	0%	0%	0%	0%	0%	0%	0 %	
Electricity	20%	17%	0%	40%	0%	44%	100 %	
EV	0%	0%	0%	0%	0%	0%	0 %	
M&C	50%	100%	0%	71%	0%	100%	0 %	

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