D8.1 – BEYOND Living Lab Activities Plan and Evaluation Report - a

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Executive Summary

The current Deliverable will inform the further development of "Task T8.1 Living Lab Setup and Activities Planning", which has as main objective the establishment of Living Labs within an open innovation 2.0 and value co-creation framework, involving all end-users and stakeholders either directly participating in or affected by the project and ranging from the project consortium partners to relevant end-users and stakeholders, along with Scientific, Technological and Business Communities. The BEYOND Living Lab operation extends from the very first stages of project implementation (user requirements phase) up to the pilot evaluation phase, aiming at the establishment of an iteration and open collaboration process that will accelerate collaborative knowledge generation and integration, technology customization and validation against real market and user needs, as well as end-product definition and go-to-market strategy creation.

The deliverable's D8.1 purpose, is to present a first outline the Living Labs methodology, the activities across the implementation, the identification of the stakeholders moreover the evaluation process of the Living Lab activities. The deliverable will be updated in a periodic basis in the upcoming months. The updated and enriched versions of the report will be submitted as deliverables D8.2, D8.3 and D8.4, in M12, M24 and M30 accordingly.

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Introduction

This deliverable presents the objectives and the methodology of the implementation of Living Labs. Moreover, this report documents the evaluation process of the Living Lab activities that will be performed during the BEYOND implementation phase. The aim of Living Lab activities, is to establish an open innovation 2.0 and value co-creation framework, involving end-users and stakeholders either directly participating in or affected by the project and ranging from the project consortium partners to relevant end-users and stakeholders, along with scientific, technological and business communities.

The Living Lab operation in the BEYOND project extends from the very early stages of the project implementation (user requirements phase) up to the pilot evaluation phase, aiming at the establishment of an iteration and open collaboration process that will accelerate collaborative knowledge generation and integration, technology customization and validation against real market and user needs, as well as end-product definition and go-to-market strategy creation. The Living Lab activities involve the definition of various interaction and collaboration mechanisms. In addition, targeted living lab workshops are taking advantage of the input of key construction stakeholders and the pilot sites end-users.

The main purpose of the Living Lab activities is to provide a user-centric approach and a co-creation of the final BEYOND solution. With this new solution, the aim is to create a new product that is user-driven and to promote the adoption of the BEYOND solution as renovation-enabling toolkit through intense dissemination and knowledge transfer of the project's outcomes toward the targeted stakeholders, reaching out to audiences within and beyond the EU.

This deliverable presents in its first and second section, the definitions of the Living Lab and their general objectives; in the third section, the methodological framework and the timeframe for the Living Lab activities are be presented, alongside the stakeholders' identification. Moreover, in the fourth section, the Living Lab instruments and roles are presented. Following that, the fifth section focuses on the evaluation of the Living Lab activities.

1. Definition of BEYOND Living Labs

The Living Lab concept established on an Open Innovation 2.0 and value co-creation framework. The concept of open innovation has evolved into a new paradigm, Open Innovation 2.0, which considers the user as an active actor in an open multi-stakeholder innovation ecosystem and as a co-creator of value. The concept of OI2 is built upon co-rated shared value, innovation ecosystems, integrated collaboration and unleashed exponential technologies. (Curley, M. & Salmelin, B. 2013).

The Living Lab concept is a user-centered, open-innovation environment integrating concurrent research and innovation processes within public-private-user partnerships. The concept of Living Lab is based on the user co-creation approach integrating research and innovation processes. The Living Lab activities are integrated through the co-creation, exploration, experimentation and evaluation of innovative ideas, scenarios, concepts and related technological artefacts in real life use cases. These specific use cases involve user communities, not only as passive observers but also as main source of formation of the final outcome of the project. This approach allows all involved stakeholders to concurrently consider both the global performance of the outcomes or results of the project and their potential adoption by users. Therefore, the Living Lab activities should start at a very early stage of the research and the development of all elements of the final product, in order to involve the user-centered approach to the entire lifecycle of the project.

The Living Lab activities, which integrate both user-centered research and open innovation, are based on the following key elements:

Real world context: Living Lab activities are occurring in simulated or in real-world contexts. In practice this means that the various solution alternatives for the new product and service ideas are co-created, tested and validated from early on in the development process, by their potential users in their natural usage environments.

Multi-stakeholder participation / Quadruple Helix approach: (Open Innovation 2.0 - A New Paradigm, EU Open Innovation and Strategy Policy Group, 2013). A wide ecosystem of actors, consisting of all relevant stakeholders from end-users to employees and value chain partners, are involved throughout the innovation process. The harmonized participation of all the main stakeholder groups is referred as a Quadruple Helix and includes the following four main stakeholders' groups, which each are able to benefit from the Living Lab process in different ways

- Business / Companies such as manufacturing and services within the value chain, primary sectors, financial sector, creative industries, social sector, large

companies, SMEs, cluster and business organizations, business driven associations, etc.

- **Research and education:** including public and private research bodies, primary schools, universities, public and private education and training, science and technology centers, technology transfer officers, etc.
- **Public Sector:** including government, EU regulators, municipalities, public procurement officers, incubators and
- **Civil Society / Users / Consumers**: including NGOs, citizens and users related to the three circular economy business models, as well as current and possible future customers of the demonstrating companies

User-engagement: Living Labs seek to identify user-centric solutions, opportunities and challenges. Involving the users already in the beginning of the development activities and across the whole innovation process is a key element of the Living Lab process.

Multi-method approach: As all Living Labs are unique, there isn't a single Living Lab methodology that can be replicated and applied. This means that series of different Service Design approaches and co-creation methods that best fit their purpose are selected and implemented during the different Living Lab phases, as the requirements and solutions evolve during multiple iterative development rounds. (Ståhlbröst, A. Holst, M. 2012)

Co-creation: is identified as the central process of the Living Lab approach. It can be defined as a cooperation between different actors or stakeholders who share the same overall objective or goal. It is about planning, developing and innovating new solutions through a specific iterative development process while utilizing various methods, techniques and tools.

2. Objectives of Living Labs

A Living Lab is an orchestrator of open innovation processes focusing on co-creation of innovations in real-world contexts by involving multiple stakeholders with the aim to generate sustainable value for all stakeholders focusing in particular on the end-users.

The BEYOND Living Lab activities will be designed to effectively reach and fulfill the following objectives:

- Obtain feedback from major stakeholders, end-users and targeted beneficiaries throughout project duration to optimize all project developments, to address critical needs of stakeholders involved in the operation of the BEYOND framework
- Disseminate the project outcomes towards end-users, beneficiaries and other linked stakeholders to initiate involvement in the various project activities.

- Create opportunities for further exploitation and replication of the project results.

3. Methodological Framework

3.1 Living Lab Activities Across the Implementation Lifecycle of BEYOND

Building stakeholders (building/ facility managers and occupants) and end-users of the applications developed in the frame of the project (DSOs, DH Network Operators, Energy Retailers, Aggregators, ESCOs, City Authorities, Construction Companies) together with external stakeholders linked to the project (such as operators of building-relevant data hubs at national levels, regulators, standardization bodies and other building data value chain stakeholders) are collectively placed at the centre of all technology configuration, innovation, demonstration and communication/ exploitation activities of the BEYOND project, which will adopt a User-Driven Innovation Approach towards addressing emerging end-user and market needs, critical for the successful project implementation and the realization of its anticipated impacts.

The User-Driven Innovation Approach aims to **involve beneficiaries and building/ building-related value chain stakeholders throughout all stages of the project life-cycle**, as key enablers of the BEYOND innovation process, towards encouraging active and collaborative contributions in the development of a unique big data-driven ecosystem around building data. **A Continuous Validation and Verification process** will be incorporated in the overall User-Driven Innovation Approach to manage **cross-functional** teams and ensure the establishment of an effective framework that will facilitate building energy performance and (sub-sequently) energy system optimization through AI big data analytics, data sharing and innovative energy services and applications. Continuous interactions between beneficiaries, end-users and project team members will be encouraged to minimize deviations between expectations and final outcomes, as well as to divide the project final outcomes into intermediate marketable results.
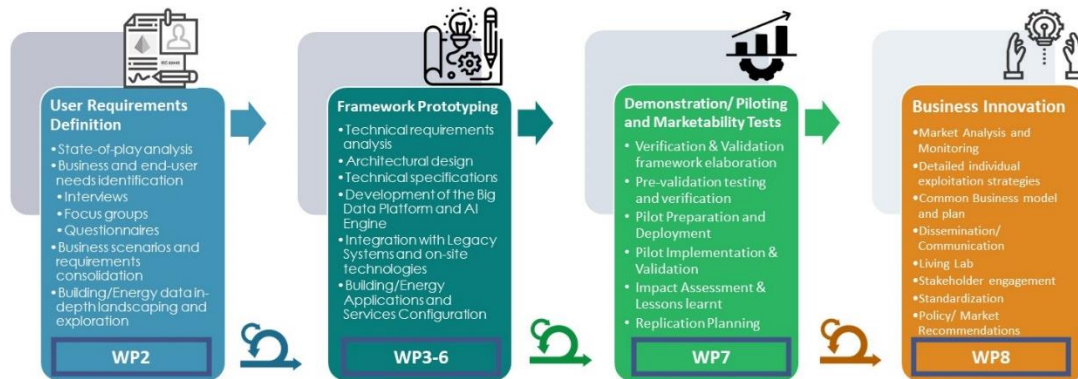
FIGURE 1: THE BEYOND IMPLEMENTATION METHODOLOGY

The **User-Driven Innovation Methodology and Approach and Agile Development** of BEYOND will be built under the auspices of the **BEYOND Living Lab.** The BEYOND Living Lab operation extends from the very first stages of project implementation (user requirements phase) up to the pilot evaluation phase, aiming at the establishment of an iteration and open collaboration process that will accelerate collaborative knowledge generation and integration, technology customization and validation against real market and user needs, as well as end-product definition and go-to-market strategy creation.

3.1.1 Phase 1: User Requirements Definition and Concept Screening Phase

During this phase, the BEYOND concept will be screened based on the actual needs of end-users along with the requirements of the business environment. On this basis, detailed design of technological components will be performed from the very beginning of the project, while detailed specifications will be drafted towards fine-tuning the BEYOND solution. Detailed audits will be performed at the project demo participants, to landscape data sources and availability, investigate integration needs of legacy systems and relevant digital technologies, understand operational processes and needs and motivate local demo partners to actively participate and share their experiences throughout the whole project duration.

Interactions in the frame of the living lab during this phase will focus on the following activities:

- End-user and Business Requirements Elicitation
- Regulatory, Socio-economic and Organizational Obstacles Identification
- Demo Sites Auditing and Data Landscaping
- BEYOND Specifications and Architectural Design

FIGURE 2: LIVING LAB FOCAL POINTS DURING PHASE 1 OF PROJECT IMPLEMENTATION

3.1.2   Phase 2: BEYOND Framework prototyping

The purpose of this phase is to integrate legacy systems, external data sources and hubs and solutions provided by the technology partners into the BEYOND Big Data-Driven framework, to enable the delivery of a fully-fledged, functional, integrated prototype which will be demonstrated to elicit user feedback and realize significant impact achievements. This phase comprises, also, activities for the optimization & fine-tuning of the BEYOND framework throughout the demonstration activities of the project.

Interactions in the frame of the living lab during this phase will focus on the following activities:

- BEYOND Big Data Platform Development, Integration with other platforms and legacy systems and data collection
- BEYOND Common Information Model and Semantic Interoperability
- BEYOND Baseline Analytics and Data Sharing Mechanisms
- BEYOND Energy Applications, focusing on Functionality and Usability Issues and Improvements
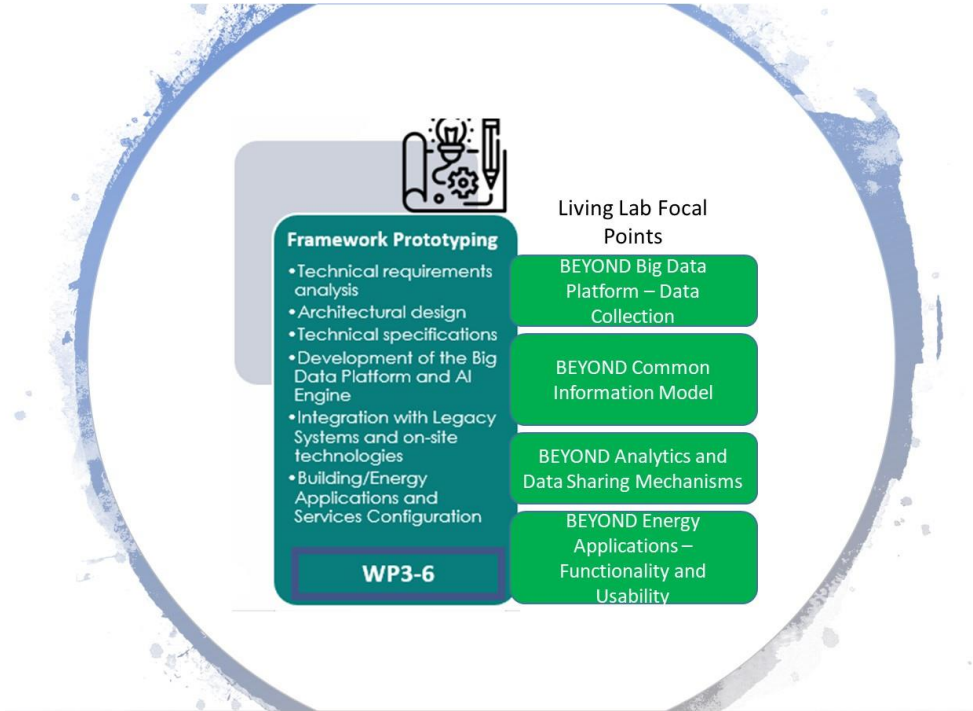
FIGURE 3: LIVING LAB FOCAL POINTS DURING PHASE 2 OF PROJECT IMPLEMENTATION

3.1.3   Phase 3: Demonstration/ Piloting and Marketability Tests

These tests represent the most important step for user co-creation. The consortium will perform unsupervised beta tests in premises resembling the target segment to obtain unbiased feedback regarding operation of the BEYOND Framework. Validation tests will involve a vast number of stakeholders and end-users involved in the BEYOND demonstrators. This phase includes demonstration, performance verification, testing and validation towards market replication. As part of this step, **Pre-Validation Testing activities** will be applied to ensure fulfilment of functional and non-functional requirements and specifications, prior to proceeding in the roll-out of the integrated framework in the pilot sites.

Interactions in the frame of the living lab during this phase will focus on the following activities:

- Refinement and Improvement of the Performance Measurement and Verification Methodology
- Engagement with pilot stakeholders (especially occupants and building managers) to ensure sustained participation in the demonstration activities
- Continuous Improvement and Refinement of the Core Big Data Platform and AI Analytics Marketplace
- Continuous Improvement and Usability Advancement of the Energy Applications delivered by BEYOND.

FIGURE 4: LIVING LAB FOCAL POINTS DURING PHASE 3 OF PROJECT IMPLEMENTATION

3.1.4 Phase 4: Business Innovation

Parallel to the implementation activities, a business innovation plan will be developed to facilitate and prepare for the commercialization phase following the project end. This plan will detail sales strategy, continuous market and competition analysis (incl. market intelligence and SWOT analysis), final marketing mix (e.g. pricing policy, promotion strategy, sales channel creation), operational plan, business unit exit strategy, financial projections (including cash-flow analysis to estimate post-project funding needs and investor targeting based on projected IRR and venture risk at commercialization time).

This phase also involves activities for the introduction of new business models for the building data value chain stakeholders, the promotion of standardization punch-lists and the communication of policy and market reform recommendations towards relevant stakeholders.

Interactions in the frame of the living lab during this phase will focus on the following activities:

- Building Data Value Chain Stakeholders' Business Models for a novel Energy Service ecosystem building.
- Standardization recommendations and punch-lists.
- Policy recommendations and market reform proposals towards realizing the value of big data solutions for the building sector.

- Definition of the BEYOND Big Data Platform and AI Analytics Marketplace Business Model, comprising in the most prominent and valuable result of the project.

FIGURE 5: LIVING LAB FOCAL POINTS DURING PHASE 4 OF PROJECT IMPLEMENTATION

In light of the increased importance of the building and energy sector stakeholders' participation in all project activities, specific activities and means will be designed to effectively reach them and foster awareness and acceptance of these activities. The Living Lab goals toward this group are very specific and critical to the success of the project and include: i) the promotion of awareness about project results and activities among key stakeholders and the obtainment of unbiased feedback; ii) the fostering of active acceptance of the project activities impacting the participants, including obtaining legal authorizations where required (regulators, public organizations); collecting necessary information; deployment of the BEYOND framework for demo activities and demo realization; and iii) establishment and maintenance of adequate communication channels with all types of stakeholders.

Towards these goals, there will be two distinct types of **BEYOND Living Labs: B2B and B2C**. The B2C Living Labs will involve the pilot participants/ consumers and B2B Living Labs involve building and energy sector stakeholders such as public authorities, facility/ building managers, energy network operators, utilities, aggregators, construction/ renovation actors and ESCOs.

3.2   BEYOND B2B Living Lab Methodology

The B2B Living Lab Methodology of BEYOND is structured over ten distinct but still interrelated steps, that ensure seamless feedback provision across any relevant project activity and its timely completion under the principles of co-creation and informed engagement.

The following figure provides a snapshot of the different methodological steps of the BEYOND B2B Living Lab Methodology, which are further analyzed in the sub-sections that follow.
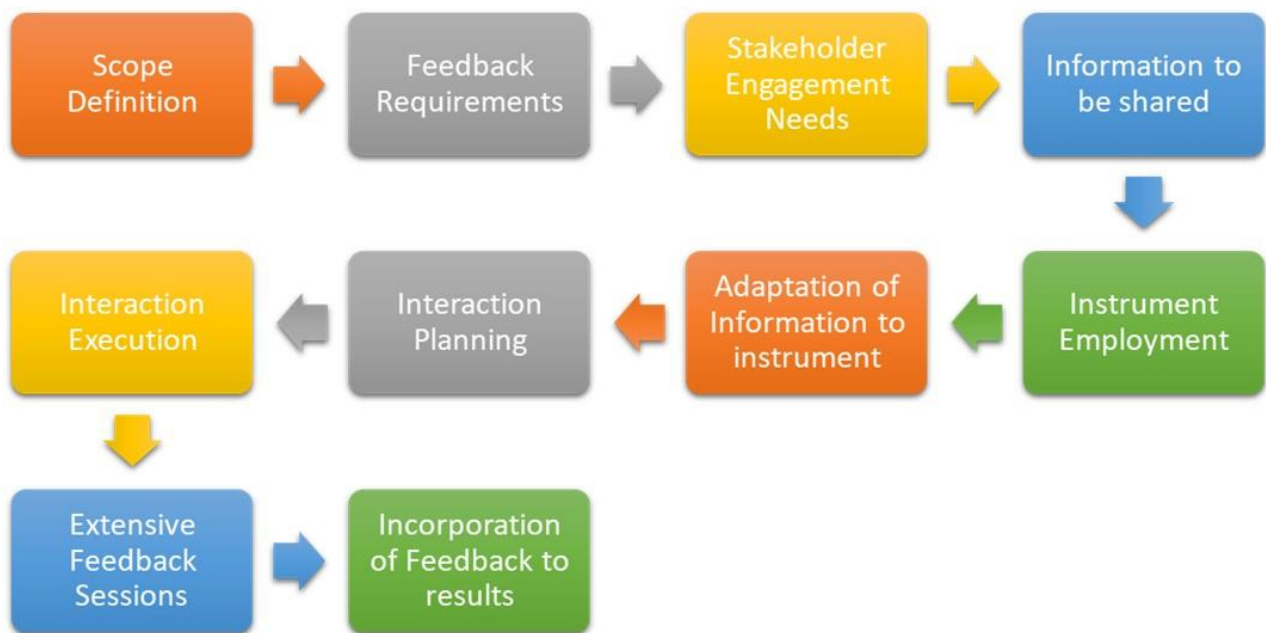
FIGURE 6: BEYOND B2B LIVING LAB METHODOLOGY

3.2.1   Scope definition

During this step of the methodology, the scope of the envisaged interaction with the building data value chain stakeholders is defined in the frame of a specific project task (e.g. T2.1) and the anticipated result of the interaction is shaped, as a first approach towards building the next steps of the methodology/ interaction in the frame of the Living Lab.

As part of this step, a specific spreadsheet will be developed and maintained online in the project's repository, where all technical partners will initially complete the task that requires to go through a validation activity and the scope of the validation (validation of activities X and Y).

TABLE 1: LIVING LAB VALIDATION ACTIVITIES – SCOPE DEFINITION TEMPLATE

WP	Task	Scope of Validation
WP2	Task 2.1	Validation of Business Scenarios
WP2	Task 2.1	Validation of Use Cases
WP2	Task 2.1	Validation of the 1st version of end-user and business requirements

3.2.2 Feedback Requirements

Having defined the scope of the interaction (at task level), the methodology advances to the next step, which defines in high level the main aspects and intermediate activities of the task upon which feedback and validation will be required in the frame of the B2B Living Lab.

In a separate spreadsheet, an associated template will be made available to the different partners, for detailing even further the different aspects that they would like to validate with the Living Lab engaged stakeholders.

TABLE 2: LIVING LAB VALIDATION ACTIVITIES – FEEDBACK REQUIREMENTS

Task	Scope of Validation	Feedback Requirements
Task 2.1	Validation of Business Scenarios	Business Scenarios for Retailers
Task 2.1	Validation of Business Scenarios	Business Scenarios for Network Operators
Task 2.1	Validation of Business Scenarios	Business Scenarios for City Authorities
Task 2.1	Validation of Business Scenarios	Business Scenarios for ESCOs
Task 2.1	Validation of Use Cases	Use Cases involving ESCOs
Task 2.1	Validation of Use Cases	Use Cases involving Aggregators

3.2.3 Stakeholder Engagement Needs

This step follows the definition of the activity aspects that will require feedback from the engaged stakeholders and proceeds with specifying: (i) the stakeholder category that will need to be engaged in the validation process, and (ii) the business profiles within specific stakeholders (personnel from specific departments and business units) that would make the interaction and feedback provision process more effective and meaningful.

An extension of the spreadsheet will allow the technical partners to define the specific stakeholders they would like to be engaged with, as shown in the following table:

TABLE 3: LIVING LAB VALIDATION ACTIVITIES – STAKEHOLDER ENGAGEMENT NEEDS

Feedback Requirements	Stakeholder	Professional Profile
Business Scenarios for Retailers	Retailer	Operations
Use Cases for Data Management	DSO	Data Management Personnel
Use Cases for Data Sharing	City Authority	Data Management Personnel, Legal Personnel, Business Development Officer

A preliminary list of the stakeholder categories (both internal and external to the consortium) and the associated professional profiles that they will need to involve in the B2B Living Lab activities of BEYOND is further elaborated in section 3.4 of the deliverable.

3.2.4 Information to be shared

This step involves the extraction of the information that will need to be shared with the stakeholders and personnel involved in the Living Lab activities, prior to the launch of the interaction, as a preparation means that will drive the overall interaction in a more informed manner.

According to the type of the stakeholder involved in the Living Lab activities different types of information will be shared and at different maturity level, since internal stakeholders (partners of the consortium) will need to validate preliminary project results based on more detailed information that has been made available by the technical partners of the consortium, while external stakeholders are envisaged to be involved in the validation process once more concrete and aggregated results have been generated with the aim to ask from them more targeted feedback on specific aspects that have been already identified (and are in need of such feedback), thus avoiding any annoying nuisance to them with low-level interactions that may lead to an increased dis-engagement from the BEYOND Living Lab.

As an example, during the process of defining the end-user and business requirements of the project (one of the first activities in the implementation of BEYOND), internal stakeholders will be involved in a continuous process of validating intermediate results (such as business scenarios, associated use cases and different versions of the elicited requirements produced in multiple sprints), while external stakeholders will be provided access to abstract information extracted from a very mature version of the end-user and business requirements, towards triggering the

interaction (possibly in a form of a structured interview) and receiving targeted feedback on specific aspects that the project needs to further elaborate and validate with external feedback.

3.2.5 Instrument Employment

The next step involves the selection of the appropriate instrument to be utilized for increasing the effectiveness of the validation process and facilitate, to the extent possible, the interaction with the different types of stakeholders.

As part of this step, **a preparatory meeting** will need to be held between the Living Lab Leader and the relevant technical partner, so as to:

1. Resolve any ambiguities of the envisaged interaction and validation activity and review together the information that will need to be shared.
2. Refine the targeted stakeholders and ensure that the proper synthesis of the audience is achieved.
3. Elaborate on the envisaged feedback to be received, so as to define the most appropriate way forward and the instrument (or combinations of them) to be employed.

A rich pool of instruments has already been identified and is presented in section 4 of this deliverable. The Living Lab Leader who acts as the coordinator of the process, as presented in section 4 of the deliverable, will select the most appropriate one by carefully assessing the inputs provided from the previous steps of the methodology together with the expectations of the targeted audience, towards making the most from each interaction and at the same time preserving engagement at extremely high levels.

3.2.6 Adaptation of Information to the Selected Instrument

Following the definition of the information to be shared and the instruments to be employed, in the previous steps, this step aims at adapting the former to the former to the format of the selected instrument and further shaping and re-fining it so as to perfectly serve the anticipated timing of the interaction with each stakeholder and the abstraction level that is required based on the professional profiles to be involved. As a rule of thumb, no technical information will be provided and shared to business development, operational and legal professionals, while professionals of a technical profile will be approached through the communication of information transformed into simplified schematics, without providing any further technical documentation of high detail.

According to the instrument selected adaptation may be performed towards transferring information to presentations or dedicated questionnaires and properly formalizing them to address the language that the targeted audience is familiar with.

3.2.7 Interaction planning

This step is launched at the time an interaction request is introduced. At this point, and together with all relevant information that need to accompany the request and are described in steps 1-4, the partner requesting the interaction shall provide, also, the time period the request shall take place to comply with the timings of the relevant activity/ task implementation.

To this end, the spreadsheet that will be used for organizing the activities of the Living Lab will be further extended to include additional planning information in the following way:

Feedback Requirements	Stakeholder	Professional Profile	Internal Validation	External Validation
Business Scenarios for Retailers	Retailer	Operations	M3-M5	M5-M7
Use Cases for Data Management	DSO	Data Management Personnel	M3-M5	M5-M7
Use Cases for Data Sharing	City Authority	Data Management Personnel, Legal Personnel, Business Development Officer	M3-M5	M5-M7

3.2.8 Interaction scheduling

With this information in hand, the Living Lab Leader will initiate contacts with relevant stakeholders (as per the request introduced) to investigate their availability for getting engaged in a specific validation activity. Following an iterative but quick process, the Living Lab Leader will agree with both sides (technical partner and engaged stakeholder) for the exact scheduling of the interaction and will be responsible for preparing all the relevant instruments (and infrastructures if needed, e.g. virtual meeting spaces, or rooms for face-to-face meetings), while notifying all involved parties with the exact details with regards to their interaction.

3.2.9 Extensive Feedback Sessions

This step refers to the actual execution of the validation activity that has been scheduled in the previous step. Any documentation, record and minutes of this

validation activity and interaction will be collected by the Living Lab Leader and will be stored in the project's file repository so that interested or affected partners can easily find them and utilize them for performing the envisaged validation of their results.

Note*: Prior to launch of any execution that involves data collection (and especially personal data collection) the Living Lab Leader will communicate to all participants (that are not directly involved to the project) a short document with information about the purpose of the data collection, the way the collected data will be used and processed and the publicity details about the collected data. The document will be accompanied by a consent form, to give the opportunity to the involved persons to provide or not their consent in the collection and publication of data that are of personal nature. All methods and means employed for protecting personal data in the Living Lab framework, will be constructed according to the relevant provisions (even at national level) of GDPR, while the whole process will be defined in detail as part of Deliverable D9.2 of the project.*

3.2.10 Incorporation of Feedback to Results

This is the last step of the BEYOND B2B Living Lab Methodology, which involves the transfer of the validation performed and feedback received, as input, to the relevant activities and its incorporation to the next release of the respective results.

This step is also associated with communicating the respective results to the participants of the specific Living Lab activities, including a brief note on how their feedback has been addressed in the respective results as a means of applauding their involvement and safeguarding their engagement in future Living Lab interactions.

3.3 Living Lab Stakeholders Identification

3.3.1 Internal Stakeholders Identification and Analysis

The involvement of the building data value chain across all stages of BEYOND implementation is imperative towards the delivery of added-value results that can achieve significant impact and be smoothly adopted by the different stakeholders in their everyday lives and operations.

The first group of stakeholders that are planned to be involved in the living lab activities of the project are the internal project stakeholders, comprising in the business actors involved in the BEYOND project that will be the ones that will finally get involved in the demonstration and validation of the BEYOND solutions in the project demo sites.

Their involvement throughout all stages of the project life cycle, as key enablers of the BEYOND innovation process aims at encouraging active and collaborative contributions in the development of a unique big data-driven ecosystem around

building sector data. Such involvement is envisaged not only during the design phase, when they will be asked to validate the requirements for the solutions to be developed along with the relevant designs. It is further extended to other activities of the project that include: (i) the comprehensive understanding of the demo sites of the project through an interactive and agile process that includes demo site auditing, characterization of the equipment and assets available, landscaping of the available data and definition of additional data needs, (ii) the provision of valuable knowledge regarding regulatory and legal issues and barriers in the different demo sites, along with elaboration on the plans to overcome them and ensure a smooth demonstration of the project results, (iii) the continuous monitoring of the development process and feedback provision on the solutions and applications to be delivered towards their optimization and easy adaptation to their actual needs, (iv) the deployment of the BEYOND results in the demonstration sites based on detailed guidance provided by the technical partners of the project; and (v) the extended demonstration and validation of the BEYOND results in the demonstration sites and additional feedback provision towards further improving and optimizing the project results based on findings and information provided by the BEYOND end-users, during the final stage of the project implementation.

The following figure presents an overview of the different building data value chain stakeholders that belong to the "Internal Stakeholders" group that will be involved in the living labs process of BEYOND:
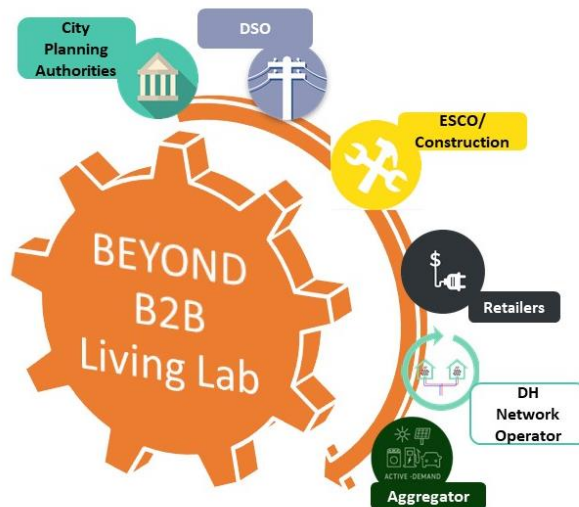
FIGURE 7: INTERNAL BUILDING DATA VALUE CHAIN STAKEHOLDERS INVOLVED IN THE BEYOND LIVING LAB

The following table presents the internal stakeholders involved in the BEYOND Living Lab, together with their relation to the different demonstration sites and solutions/ applications for which they are considered as the main beneficiaries and end-users:

TABLE 4: OVERVIEW OF INTERNAL STAKEHOLDERS OF THE BEYOND LIVING LAB AND THEIR RELATION TO DEMO SITES AND BEYOND RESULTS

Stakeholder Category	Partner Name	Relevant Demo Site	Relevant BEYOND Result
DSO	Cuerva	Spain	• BEYOND Big Data Platform (WP3) • BEYOND AI Analytics Marketplace (WP4) • Distribution Grid Planning and Infrastructure Sizing Tool (T5.2)
City Planning Authority	FVH	Finland	• BEYOND Big Data Platform (WP3) • BEYOND AI Analytics Marketplace (WP4) • Impact Assessment Tool for Energy Policy Making at urban level (T5.1)
ESCO/ Renovation Companies	IGM	Pre-Validation site	• BEYOND Big Data Platform (WP3) • BEYOND AI Analytics Marketplace (WP4) • Renovation Optimization Decision Support Tool (T5.3) • Building Digital Twins Environment for Energy Performance Optimization, Self-consumption Maximization and Predictive Maintenance (T6.1) • Energy Performance and Smart Readiness Certification Tool (T6.4)
	Urbener	Spain	
Retailers	Mytilineos	Greece	• BEYOND Big Data Platform (WP3) • BEYOND AI Analytics Marketplace (WP4) • Building Portfolio Management Optimization Tool (T6.2) • Personalized Energy Analytics Tool for Guidance on Energy Performance Optimization and Human-Centric Control Automation (T6.3) • Energy Performance and Smart Readiness Certification Tool (T6.4)
	Cuerva	Spain	
	BEOELEK	Serbia	
DH Network Operator	BEOELEK	Serbia	• BEYOND Big Data Platform (WP3) • BEYOND AI Analytics Marketplace (WP4) • District Heating Network Planning and Infrastructure Sizing Tool (T5.2)
Aggregator	Urbener	Spain	• BEYOND Big Data Platform (WP3)

			• BEYOND AI Analytics Marketplace (WP4) • Flexibility-based VPP Configurator and DR Strategies Optimization Tool (T6.5)

### 3.3.2 External Stakeholders Identification and Analysis

The second group of stakeholders that are planned to be involved in the living lab activities of the project refers to external stakeholders including:

- Stakeholders that their operations are affected by building data and the applications that will be released and demonstrated during BEYOND (mainly located in the demo sites) but are not involved in the BEYOND consortium (e.g. Transmission System Operators/ TSOs, Local Energy Communities, RES Operators, Energy Market Operators).
- Stakeholders that set the scene and the background for the deployment and demonstration of results and need to be consulted as the implementation of the project progresses, so as to identify potential barriers and ways to overcome them (e.g. regulatory authorities, professional associations, policy makers, standardization bodies, data privacy authorities and experts, consumer associations). Such stakeholders are mainly expected to be located and be relevant to the BEYOND Demo Sites, though, for more horizontal issues referring to standardization, regulation and policy making, the consortium (through the Living Lab) is expected to reach to EU-wide stakeholders to consult them and receive feedback and input for fine-tuning the relevant project results.
- Stakeholders with similar roles to the Internal Stakeholder groups, but not participating in the consortium, allowing for the provision of more extended feedback and additional comments on the basis of diverse contexts, so as to enable wide adoption and acceptance of the BEYOND results across the EU and not limited to the countries involved in the consortium.

In contrast to the interactions that will be performed with the Internal Stakeholders of the Living Lab, external stakeholders will be contacted and engaged once specific results have been delivered. Such results will be briefly discussed with them (always focusing on relevant aspects to their functions, operations and interests) to drive feedback sessions and loops that will lead to the fine-tuning of the BEYOND outcomes in follow up versions that have been already planned in the frame of the iterative methodology followed for the implementation of the project.

The following figure presents an overview of the external stakeholders' involvement into the BEYOND Living Lab:
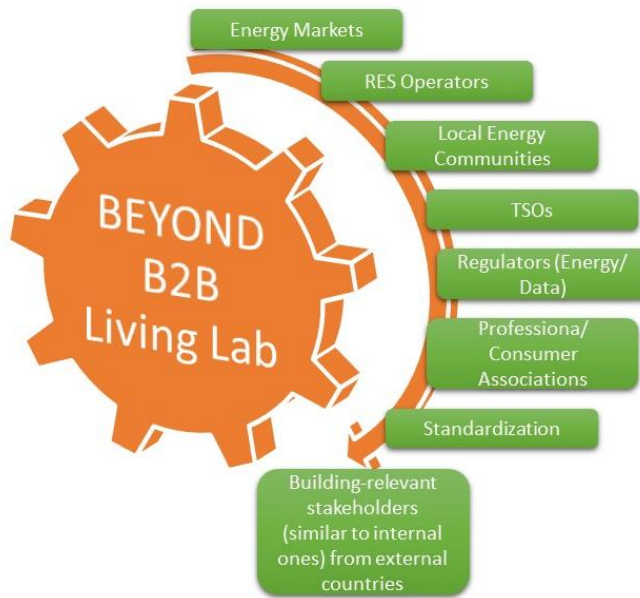
FIGURE 8: EXTERNAL BUILDING DATA VALUE CHAIN STAKEHOLDERS TO BE INVOLVED IN THE BEYOND LIVING LAB

It needs to be highlighted that BEYOND will be involved in knowledge transfer activities and will develop synergies with other projects and initiatives in the domain (e.g. DAIRO/BDVA, BRIDGE, ECTP) though these activities are not falling under the activities (co-creation-related) of the BEYOND Living Lab and are addressed by separate action lines of the project, orchestrated under the auspices of T8.2 and reported in the respective deliverables.

3.3.3 Professional Profiles per Involved Stakeholder in the BEYOND Living Lab

Since BEYOND involves a variety of activities of diverse nature (from pure technical activities to activities touching business and legal aspects) it is imperative that the appropriate profiles per stakeholder are involved in the envisaged interactions performed under the umbrella of the BEYOND Living Lab.

In this context, technical personnel will need to be involved in interactions referring to the Big Data Platform and Analytics offered by BEYOND, while Operations' personnel will need to have the final word when it comes to the energy applications (WP5-WP6) that will be deployed and used by them during the BEYOND demonstration phase. Additionally, legal experts will need to be engaged for addressing issues related to data protection and data sharing contracts, while business development personnel will need to assess the validity, feasibility and effectiveness of the business models that will result by the relevant activities of BEYOND.

The following table, presents a preliminary mapping between BEYOND Living Labs Stakeholder Categories and the business/ professional profiles that will need to be engaged to the BEYOND Living Labs, based on their role in the project and/ or their expected contribution and feedback to the different project activities and results (especially when referring to external stakeholders).

TABLE 5: PROFESSIONAL PROFILES INVOLVEMENT PER STAKEHOLDER CATEGORY IN THE BEYOND LIVING LAB

Living Lab Stakeholders	Stakeholders Types	Professional Profiles Involved
Internal Stakeholders	**DSO** – Cuerva	• Operations Personnel • Data Management Personnel (management, interoperability, sharing, protection, security) • Data scientists / analysts • Legal Department / Data Protection Officers • Business development and strategy officers
	City Planning Authorities - FVH	• Operations Personnel • Data Management Personnel (management, interoperability, sharing, protection, security) • Data scientists / analysts • Legal Department / Data Protection Officers • Business development and strategy officers
	ESCOs/ Renovation Companies – IGM, Urbener	• Operations Personnel • Data Management Personnel (management, interoperability, sharing, protection, security) • Data scientists / analysts • Legal Department / Data Protection Officers • Business development and strategy officers
	Retailers – Mytilineos, Cuerva, BEOELEK	• Operations Personnel • Data Management Personnel (management, interoperability, sharing, protection, security) • Data scientists / analysts • Legal Department / Data Protection Officers • Business development and strategy officers

|		
	DH Network Operators - BEOELEK	• Operations Personnel • Data Management Personnel (management, interoperability, sharing, protection, security) • Data scientists / analysts • Legal Department / Data Protection Officers • Business development and strategy officers
	Aggregator - Urbener	• Operations Personnel • Data Management Personnel (management, interoperability, sharing, protection, security) • Data scientists / analysts • Legal Department / Data Protection Officers • Business development and strategy officers
External Stakeholders	**TSOs**	• Operations Personnel • Data Management Personnel (management, interoperability, sharing, protection, security) • Data scientists / analysts
	Local Energy Communities	• Operations Personnel • Data Management Personnel (management, interoperability, sharing, protection, security)
	RES Operators	• Operations Personnel • Data Management Personnel (management, interoperability, sharing, protection, security) • Data scientists / analysts • Business development and strategy officers
	Energy Markets Regulators	• Operations Personnel • Legal Department
	Professional/ Consumer Associations	• Legal Department • Strategy Officers • Data Management Experts
	Standardization bodies	• Data Management Experts (management, interoperability, sharing, protection, security)
	DSOs, ESCOs, DH Network Operators, Retailers,	• Operations Personnel • Data Management Personnel (management, interoperability, sharing, protection, security)

	Aggregators, City Authorities (external to the BEYOND Consortium)	- Data scientists / analysts - Legal Department / Data Protection Officers - Business development and strategy officers

3.4 Preliminary Plan of envisaged validation activities in the frame of the BEYOND B2B Living Lab (M3-M12)

The following figure presents an overview of the envisaged Living Lab Activities to be implemented during the first 12 months of the project, following a top-down analysis performed by the technical partners involved in the implementation of the BEYOND project.
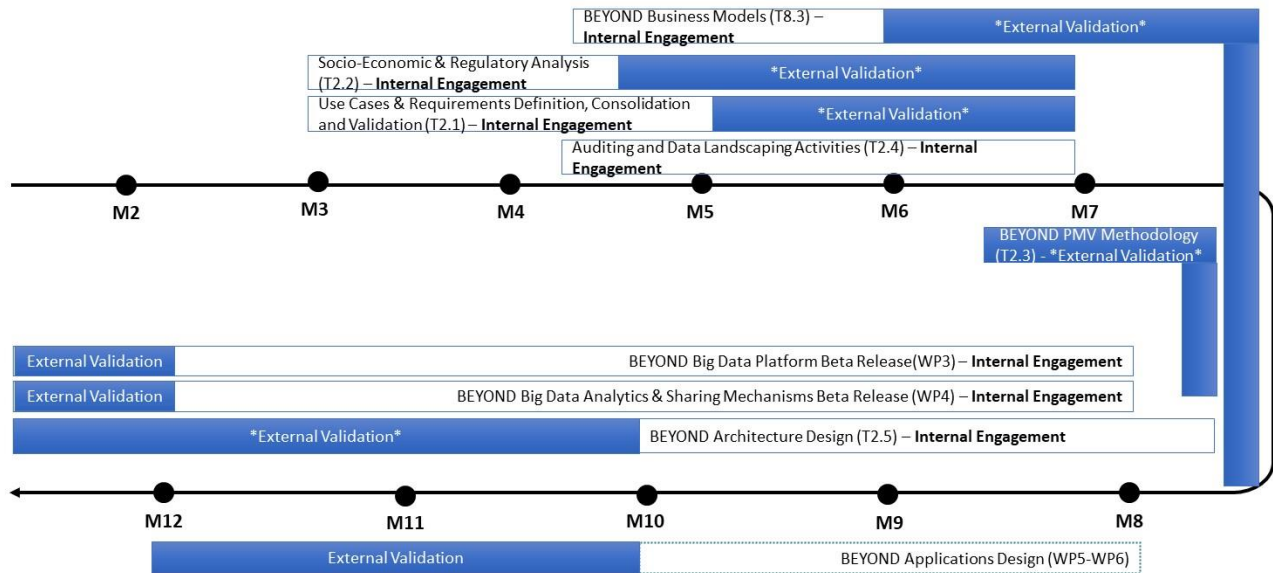
FIGURE 9: TOP-DOWN PLANNING OF BEYOND B2B LIVING LAB ACTIVITIES FOR THE FIRST YEAR OF THE PROJECT

A more detailed table of the envisaged interactions with internal and external stakeholders in the frame of the BEYOND B2B Living Lab is presented below, following a bottom-up approach from the input received from the BEYOND technical partners:

TABLE 6: OF THE ENVISAGED INTERACTIONS WITH INTERNAL AND EXTERNAL STAKEHOLDERS

WP	Task	Scope of Validation	Feedback Requirements	Stakeholder	Professional Profile	Internal Validatic	External Validatic
WP2	Task 2.1	Validation of Business Scenarios	Business Scenarios for Retailers	Retailer	Operations	M3-M5	M5-M7
WP2	Task 2.1	Validation of Business Scenarios	Business Scenarios for Aggregators	Aggregator	Operations	M3-M5	M5-M7
WP2	Task 2.1	Validation of Business Scenarios	Business Scenarios for DSOs	DSO	Operations	M3-M5	M5-M7
WP2	Task 2.1	Validation of Business Scenarios	Business Scenarios for ESCOs/ Renovation Companies	ESCO/ Renovation	Operations	M3-M5	M5-M7
WP2	Task 2.1	Validation of Business Scenarios	Business Scenarios for DH Network Operators	DH Net. Operator	Operations	M3-M5	M5-M7
WP2	Task 2.1	Validation of Business Scenarios	Business Scenarios for City Authorities	City	Operations	M3-M5	M5-M7
WP2	Task 2.1	Validation of Business Scenarios	Validation of Data-Relevant Business Scenarios	All Value Chain Actors	Data Management Personnel Data Analysts Legal Personnel	M3-M5	M5-M7
WP2	Task 2.1	Validation of Use Cases	Use Cases for Retailers	Retailer	Operations	M3-M5	M5-M7
WP2	Task 2.1	Validation of Use Cases	Use Cases for Aggregators	Aggregator	Operations	M3-M5	M5-M7
WP2	Task 2.1	Validation of Use Cases	Use Cases for DSOs	DSO	Operations	M3-M5	M5-M7
WP2	Task 2.1	Validation of Use Cases	Use Cases for ESCOs/ Renovation Companies	ESCO/ Renovation	Operations	M3-M5	M5-M7
WP2	Task 2.1	Validation of Use Cases	Use Cases for DH Network Operators	DH Net. Operator	Operations	M3-M5	M5-M7
WP2	Task 2.1	Validation of Use Cases	Use Cases for City Authorities	City	Operations	M3-M5	M5-M7
WP2	Task 2.1	Validation of Use Cases	Validation of Data-Relevant Use Cases	All Value Chain Actors	Data Management Personnel Data Analysts Legal Personnel	M3-M5	M5-M7
WP2	Task 2.1	Validation of Requirements	WP3-WP4 Requirements	All Value Chain Actors	Data Management Personnel Data Analysts	M3-M5	M5-M7
WP2	Task 2.1	Validation of Requirements	WP5-WP6 Requirements	All Value Chain Actors	Operations	M3-M5	M5-M7
WP2	Task 2.2	Investigation of Barriers	Regulatory Barriers	All Value Chain Actors	Legal Personnel Operations	M3-M5	M5-M7
WP2	Task 2.2	Investigation of Barriers	Regulatory Barriers	Regulators	Legal Personnel		M5-M7
WP2	Task 2.2	Investigation of Barriers	Socio-economic/ Organizational Barriers	All Value Chain Actors	Data Management Personnel Operations Business Development Officers	M3-M5	M5-M7
WP2	Task 2.3	Validation of BEYOND PMV	Flexibility Baselining approach	Aggregators	Operations		M6-M8
WP2	Task 2.4	Pilot Auditing	Demo Assets Auditing	All Demo Partners	Operations	M4-M7	
WP2	T2.4	Pilot Auditing	Data Landscaping	All Demo Partners	Data Management Personnel Data Analytics Personnel Legal Personnel	M4-M7	
WP2	T2.5	Validation of Architecture	Technical Specifications and Interfaces	All Demo Partners	Data Management Personnel Data Analytics Personnel	M8-M10	
WP2	T2.5	Validation of Architecture	Technical Specifications and Interfaces	Selected Value Chain Actors	Data Management Personnel Data Analytics Personnel		M10-M12
WP3	All tasks	BEYOND Big Data Platform	Beta Release and Features	All Demo Partners	Data Management Personnel	M8-M12	
WP3	All tasks	BEYOND Big Data Platform	Beta Release and Features	Selected Value Chain Actors	Data Management Personnel		M12-
WP4	All tasks	BEYOND AI Analytics Marketplace	Baseline Analytics Beta Release	All Demo Partners	Data Analytics Personnel	M8-M12	
WP4	All tasks	BEYOND AI Analytics Marketplace	Baseline Analytics Beta Release	Selected Value Chain Actors	Data Analytics Personnel		M12-
WP4	All tasks	BEYOND AI Analytics Marketplace	Data Sharing Mechanisms Beta Release	All Demo Partners	Legal Personnel	M8-M12	
WP4	All tasks	BEYOND AI Analytics Marketplace	Data Sharing Mechanisms Beta Release	Selected Value Chain Actors	Legal Personnel		M12-
WP8	Task 8.3	Business Model Validation	Business Model Drafts and Data/ Cash Flows	All Value Chain Actors	Operations Business Development Officers	M4-M6	M6-M8

3.5 The BEYOND B2C Living Lab Methodology

The BEYOND B2C Living Lab Methodology is a proper adaptation of the generic methodology introduced for the B2B Living Labs, though it involves some slight differences that have led to the instantiation of a different approach.

In fact, the B2C Living Lab refers only to interactions that aim at the engagement of building occupants and managers in the demo sites, towards providing their input and feedback across very specific implementation phases of the project.

In contrast to the B2B Living Lab Method, occupants and building managers are not expected to get involved in the second phase of the Project, where the BEYOND prototyping will take place. Moreover, the activities will be implemented only internally in the consortium, and in this sense, they do not require coordination with and involvement of external stakeholders.

The BEYOND B2C Living Lab Methodology will be adapted so as to further incorporate activities that will deal with the increase of awareness and engagement of the building occupants and building managers in the demo sites of the project, through appropriate dissemination campaigns that will be organized under Task 8.2 of the project, along with the generation of associated communication material and kits that will target this specific target audience with highly relevant, simplified messages, as well as, acknowledgments at the end of each engagement and interaction.

At specific stages of the process the Living Lab will also employ training activities, that will be properly planned and documented in the next version of this deliverable. Such training activities will be planned prior to the initiation of the demonstration phase of the project to ensure the smooth adoption of the applications referring to building occupants in the BEYOND demo sites.

The altered methodology is presented in the following figure:
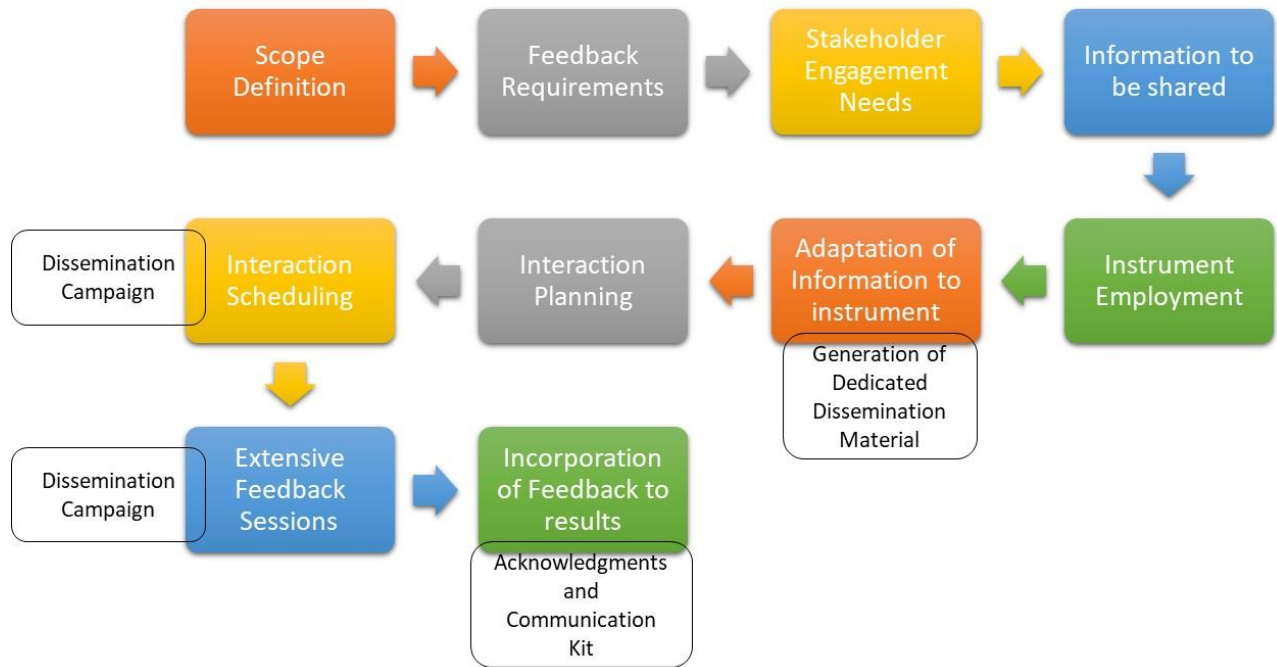
FIGURE 10: ADAPTED METHODOLOGY FOR THE B2C LIVING LABS

3.6 Preliminary Plan of envisaged validation activities in the frame of the BEYOND B2C Living Lab (M3-M12)

The following figure presents an overview of the envisaged B2C Living Lab Activities to be implemented during the first 12 months of the project, following a top-down analysis performed by the technical partners involved in the implementation of the BEYOND project.

FIGURE 11: TOP-DOWN PLANNING OF BEYOND B2C LIVING LAB ACTIVITIES FOR THE FIRST YEAR OF THE PROJECT

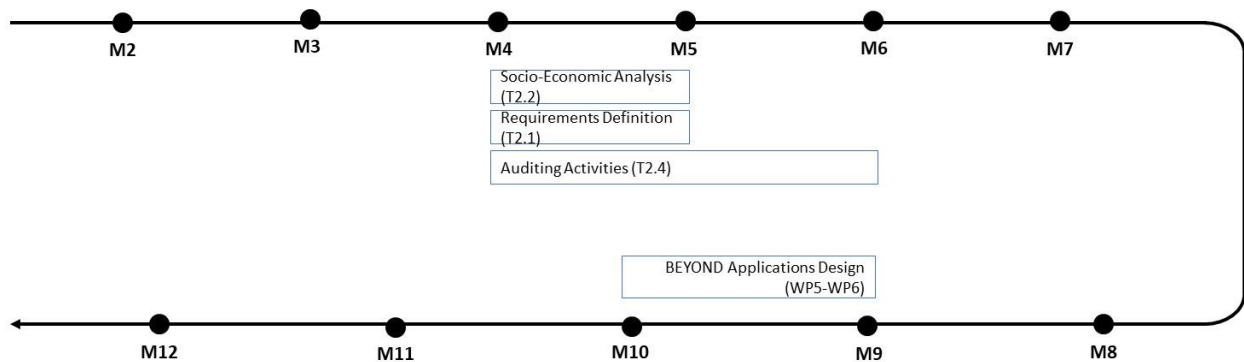A more detailed table of the envisaged interactions with the building occupants and managers in the frame of the BEYOND B2C Living Lab is presented below, following a bottom-up approach from the input received from the BEYOND technical partners:

TABLE 7: BOTTOM-UP PLAN OF BEYOND B2C LIVING LAB ACTIVITIES

WP	Task	Scope of Validation	Feedback Requirements	Stakeholder	Engagement Period
WP2	Task 2.1	Requirements Elicitation	WP5-WP6 Requirements	Building Occupants/ Managers	M4-M5
WP2	Task 2.2	Investigation of Barriers	Socio-economic Barriers	Building Occupants/ Managers	M4-M5
WP2	Task 2.4	Pilot Auditing	Demo Assets Auditing	Building Occupants/ Managers	M4-M6
WP6	All Tasks	Apps Design	WP6 Applications design - feedback from Occupants	Building Occupants	M9-M10

4. Living Lab Instruments and Roles

4.1   Living Lab Engagement Instruments Pool

The definition of specific engagements instruments per different cluster of stakeholders, or based on national, social or other criteria is not considered the optimal way forward to achieve increased efficiency for the BEYOND Living Labs. On the contrary and since the "one-size-fits-all" concept would be rather irrelevant in the context of the BEYOND Living Labs, a pool of instruments has been defined and presented below, which will allow the Living Lab leader to assess and select the optimal one (or combinations of them) based on the unique characteristics of the stakeholder to be involved and the envisaged interaction and its nature/content.

Such instruments include:

4.1.1   Questionnaires and Surveys

This instrument is considered especially useful and important whenever a non-extensive input provision process is need to be in place, involving mostly internal stakeholders and building occupants. Since the project involves several such processes, at several points of the project implementation (and mainly during phases 1 and 3) dedicated questionnaires will be created and distributed among the Living Lab stakeholders. This instrument is really useful, also, in cases quick feedback is required by the stakeholders involved in the Living Lab since they involve no burden in terms of logistics and organization and can be rapidly triggered and launched once the relevant content has been defined.

4.1.2   Workshop Organization

Workshops are considered a highly effective means of engagement, along with awareness creation, especially when engagement activities refer to wider audiences (if compared with focus groups that are analyzed below). They are mainly intended to demonstrate results and remarkable developments and receiving generic feedback mostly from properly clustered audiences with similar characteristics and business functions. In this sense, it is also considered a highly important means for the B2C Living Lab of BEYOND due to the high commonality observed among the building occupants in each demo site.

Such workshops can be accompanied by promotional videos or interactive material as a means of demonstrating in an intuitive manner the BEYOND developments to increase awareness and raise interest, especially with regards to the BEYOND applications.

4.1.3   Focus Groups

Focus groups can provide the means for obtaining invaluable feedback and directly interacting with business stakeholders (BEYOND Building Data Value Chain Stakeholders), through the engagement with 3-5 professionals from similar organizations or of similar professional profile. This is a means to be utilized during the 2nd year of the project, when the prototyping activities will have advanced and dedicated focus groups and feedback sessions will be organized for demonstrating specific features of the BEYOND solutions and receiving targeted feedback from the involved stakeholders.

4.1.4   Dedicated Interviews

Interviews are considered an invaluable means for gaining in-depth insights and understanding of the expectations a stakeholder has out of a specific solution or result, while freely communicating relevant concerns and bottlenecks that may hinder its adoption under specific circumstances. Especially in the case of BEYOND, where multiple Building Data Value Chain Stakeholders are involved and interact with each other by sharing data and intelligence, interviews are expected to be highly utilized across all stages of the project so as to grasp targeted feedback that may not be feasible to be communicated otherwise. Feedback during interviews is expected to address all aspects of the BEYOND project, from purely technical issues to more business-relevant ones. Interviews are expected to be utilized mainly in the frame of the B2B Living Lab Activities, due to the fact that it would be impossible to utilize such a means in the B2C because of the number of participants that are expected to be engaged in the demo sites (some hundreds).

4.1.5   Training Seminars

Training seminars will be organized across both living labs to safeguard the preparation of the demo site stakeholders for the demonstration activities of the project. They will be held mostly online, however, if circumstances allow, specific sessions may be held also physically.

4.1.6   Working Groups

Specific activities will be involved in the Living Labs instrument pool at a later stage during the project, towards enabling interaction with standardization bodies, policy makers and other high-level stakeholders that are directly linked with the promotion of the standardization and policy/ market reform recommendations towards the relevant communities.

4.1.7   Additional Material

Even though not directly contributing to the Living Lab Activities and Engagements, tailor-made brochures, fact sheets, posters, newsletters, press releases and articles will be produced as supporting material to selected interactions and activities, while dedicated news items and notifications will be pushed through the BEYOND website and social media accounts, as further analyzed and defined in D8.6.

As a rule of thumb and based on a theoretical evaluation, an initial suitability alignment between the instruments available and the different types of Living Labs and Stakeholders, is provided in the following figures:

TABLE 8: PRELIMINARY SUITABILITY ASSESSMENT OF INSTRUMENTS TO THE 2 TYPES OF THE BEYOND LIVING LABS

B2B Living Lab	B2C Living Lab
Interviews Working Groups Focus Groups Training Seminars	Workshops Training Seminars Surveys

Internal Stakeholders	External Stakeholders
Face-to-face interview Training Seminars Dedicated Surveys Training Seminars Demonstration Workshops Awareness Activities	Remote Interview Focus Groups Working Groups Demonstration Workshops Dissemination Events

4.2   Living Lab Roles among the BEYOND Consortium

To ensure the successful implementation of Living Lab Activities in the BEYOND project, all consortium partners have agreed and adopted a Lean Living Lab Coordination Structure, with well-defined roles and responsibilities shared among key project partners as presented below:

Role	Assumed by	Main responsibilities
Living Lab Leader	WP8 Leader/ Project Coordinator	• Orchestration and guidance over the whole Living Lab Process.

		• Preparation and pre-assessment (for selection) of all available instruments. • Logistics handling and organization of activities. • Preparation of additional communication material • Monitoring of the Living Lab activities and reporting
Living Lab Contributors	Task and Work Package Leaders	• Triggering of interactions. • Input provision and technical details elaboration for sharing with involved stakeholders • Coordination with the Living Lab Leader for the implementation of activities • Provision of estimated periods for the execution of engagements and interactions • Participation in the relevant living lab activities • Provision of activity records, minutes and material and reporting to the Living Lab Leader
Living Lab Facilitator	Technical Coordinator	• Guidance on anticipated Living Lab Activities • Refinement of material to be shared with stakeholders • Coordination with the Living Lab Leader for the implementation of activities • Participation and Lead of living lab activities with the engagement of external stakeholders. • Provision of generic picture about the project during living lab activities with external stakeholders • Provision of activity records, minutes and material and reporting to the Living Lab Leader • Organization and Lead of demonstration sessions.

5. Evaluation of Living Lab activities

The evaluation stage enables to generate a qualitative and quantitative measurement of the Living Lab activities, illustrating potential impact and added-value created. A model of participatory monitoring is an important input to the living lab methodology and activities. Appropriate KPIs are defined in order to capture the success of the Living Lab activities:

- **KPI 1.** Number of questionnaires distributed among the Living Lab stakeholders.
- **KPI 2.** Number of local workshops organized in each demo country
- **KPI 3.** Number of attendees in the workshops
- **KPI 4.** Number of dedicated interactions for feedback receiving from Focus Groups
- **KPI 5.** Number of interviews to grasp targeted feedback
- **KPI 6.** Number of attendees in Training Seminars
- **KPI 7.** Number of dedicated interactions for feedback receiving form Working Groups

During the Living Lab activities feedback will be generated from stakeholders. The value of this feedback and how it is integrated back into the BEYOND process, will be checked from the Living Lab Leader, Living Lab Contributors and the Living Lab Facilitator.

Finally, as described in "D8.6 - BEYOND Dissemination and Communication Plan and Associated Material – a" several quantified targets are set to measure the Living Lab activities boosting reach and dissemination of project outcomes.

Conclusions

In conclusion, the deliverable D8.1 – "BEYOND Living Lab Activities Plan and Evaluation Report - a" aims to describe the methodology, the stakeholders and all the actions that need to be performed in during the whole lifespan of the BEYOND project. To ensure the successful implementation of Living Lab Activities, a Lean Living Lab Coordination Structure was established, with well-defined roles and responsibilities shared among key project partners.

The User-Driven Innovation Approach aims to involve beneficiaries and building/ building-related value chain stakeholders throughout all stages of the project life-cycle, which will be divided in 4 phases: (i) User Requirements Definition and Concept Screening Phase (ii) BEYOND Framework prototyping (iii) Demonstration/ Piloting and Marketability Tests (iv) Business Innovation.

There are be two distinct types of BEYOND Living Labs: B2B and B2C. The B2C Living Labs will involve the pilot participants/ consumers and B2B Living Labs involve building and energy sector stakeholders such as public authorities, facility/ building managers, energy network operators, utilities, aggregators, construction/ renovation actors and ESCOs. The main difference of the 2 types is that in the B2C Living Labs, occupants and building managers are not expected to get involved in the second phase of the Project, where the BEYOND prototyping will take place, on the contrary the stakeholders of the B2B Living Labs will get involved throughout all phases of the project life cycle, as key enablers of the BEYOND implementation.

The groups of stakeholders that will get involved in the Living Lab activities are the internal project stakeholders (within the consortium) and the external project stakeholders. Both groups have been identified in the deliverable. Furthermore, a pool of instruments has been defined and presented, in order to be used based on the unique characteristics of the different group of stakeholders.