

WP1-D1: Plan for Stakeholder Engagement and SMARTLAB Journeys Including SMARTLAB Calendar of Events

SMARTLAB | Work Package 1, Task 1

Final delivery date: 11-12-2022
Submission to QA group: 28-10-2022



Deliverable version	v.05
Dissemination level	Public
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Document Information

Project Acronym	SMARTLAB
Project Title	The Smart Building Lab
Principal Investigator	Professor Stephen Kinsella, University of Limerick
Project Duration	12 September 2022 - 11 September 2024
Deliverable Number	WP1-D1: Plan for Stakeholder Engagement and SMARTLAB Journeys Including SMARTLAB Calendar of Events
Dissemination Level	PU-Public
License	CC-BY4.0
Status	Completed
Due Date	11-12-2022
Work Package	WP1 - Stakeholder Engagement and Living Lab Processes
Lead Beneficiary	UL
Contributing Beneficiaries	CCI, IESRD, LCCC, TCL

Revision History

Date	Version	Author	Substantive changes made
25-10-2022	v.1	As above	First version of document drafted
28-10-2022	v.2	As above	Circulated for QA by SMARTLAB Team
04-11-2022	v.3	As above	QA Revisions
11-11-2022	v.4	As above	Further QA revisions
11-12-2022	v.5	As above	Final revision prior to submission

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List of Acronyms

CCI	Carrig Conservation International
CIL	Citizen Innovation Lab
D	Deliverable
DIY	Do It Yourself
ENoLL	European Network of Living Labs
EPBD	Energy Performance of Buildings Directive
EU	European Union
IESRD	Integrated Environmental Solutions Research & Development
LCCC	Limerick City and County Council
LDT	Limerick Digital Twin
LDZ	Limerick Decarbonisation Zone
LPWAN	Low-power wide-area network
NB-IoT	Narrowband Internet of things
PEB	Positive Energy Block
PED	Positive Energy District
SEAI	Sustainable Energy Authority of Ireland
SMARTLAB	Smart Building Living Lab
SRI	Smart Readiness Indicator
TCL	The Convex Lens
THBs	Traditional and Heritage Buildings
UL	University of Limerick
WP	Work Package

Executive Summary

It is envisaged that a future decarbonised energy grid will communicate with buildings using smart sensor technology. To prepare for this, the Smart Building Living Lab (SMARTLAB) project is exploring how to make buildings more smart-ready, and is examining the adoption of indicators, such as the EU Smart Readiness Indicator (SRI) in Ireland. Implemented as a policy Living Lab, the project will work directly with end users across a range of use cases to generate insights and data to inform SRI policy development. SMARTLAB will install wireless sensor technology in 50 to 100 buildings in Limerick's Decarbonisation Zone, create a framework for upgrading existing buildings to be smart using DIY toolkits and off the shelf components, and identify the city-scale infrastructure that could be deployed to reduce the costs for building owners investing in the smart readiness of their buildings. Focused on building capacity for and accelerating the adoption of clean energy innovation, SMARTLAB will demonstrate both energy and non-energy smart services and examine technical and financial barriers to the deployment of smart technologies and services in Ireland's buildings.

Limerick's Citizen Innovation Lab, a European Network of Living Labs (ENoLL) member Living Lab, will provide the physical infrastructure for Living Lab implementation, and SMARTLAB will build upon frameworks, solutions and institutional knowledge from the Citizen Innovation Lab's portfolio of projects to date. SMARTLAB will share data and insights amongst public bodies, policy makers and other stakeholders during project implementation as part of its systematic co-creation approach. Results will be disseminated widely to further a low carbon economy in Ireland that is smart, sustainable, secure and affordable.

This Deliverable, *Plan for Stakeholder Engagement and SMARTLAB Journeys Including a SMARTLAB Calendar of Events (WP1-D1)*, sets out the project's structured approach to stakeholder engagement. Its objective is to ensure the generation of actionable insights and robust data through carefully orchestrated interactions with the three main stakeholder groups - building owners and occupants, policy makers and other stakeholders. It introduces the Living Lab methodology, proposes three main phases in Living Lab implementation - Exploration, Experimentation and Evaluation - and describes the local context for implementation. The structure for stakeholder engagement including SMARTLAB Journeys and a SMARTLAB Calendar of Events is then described. These connect SMARTLAB tasks and objectives with engagement activities, and opportunities for data gathering and sensemaking as part of an iterative process of innovation.

Living Lab implementation will be documented and evaluated in the SMARTLAB Playbook of Engagement Activities and Events I and II - SMARTLAB deliverables WP1-D6 and WP1-D7 - due in months 10 and 23 of project implementation.

1 Introduction

It is envisaged that a future decarbonised energy grid will communicate with buildings using smart sensor technology. To prepare for this, the Smart Building Living Lab (SMARTLAB) project is exploring how to make buildings more smart-ready, and is examining the adoption of indicators such as the EU Smart Readiness Indicator (SRI) in Ireland. Implemented as a policy Living Lab, the project will work directly with end users across a range of use cases to generate insights and data to inform SRI policy development. SMARTLAB will install wireless sensor technology in 50 to 100 buildings in Limerick's Decarbonisation Zone, create a framework for upgrading existing buildings to be smart using DIY toolkits and off the shelf components, and identify the city-scale infrastructure that could be deployed to reduce the costs for building owners investing in the smart readiness of their buildings. Focused on building capacity for and accelerating the adoption of clean energy innovation, SMARTLAB will demonstrate both energy and non-energy smart services and examine technical and financial barriers to the deployment of smart technologies and services in Ireland's buildings.

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Living Labs are real-world environments for testing and experimentation where citizens and communities, researchers, business, and government work together to co-create innovative solutions. They differ from testbeds - where new technologies or approaches are trialled in real-world settings - in that end users, along with other stakeholders of the innovation, are involved in the process of innovation in a systematic way. Living Labs, through their open innovation approach, have the potential to support greater adoption of an innovation, as project participants can become the first to adopt the innovation concerned.

This document contains the Smart Building Living Lab (SMARTLAB) plan for stakeholder engagement including SMARTLAB Journeys and the SMARTLAB Calendar of Events. It will be used to animate the SMARTLAB Living Lab, an open innovation ecosystem for project implementation. The Citizen Innovation Lab with Fab Lab Limerick provide the physical infrastructure for the project's co-creation approach and technology demonstrators. Limerick's Decarbonisation Zone (LDZ) is the target area for project implementation.

This report contributes to a portfolio of outputs to facilitate the development of stakeholder engagement and Living Lab processes in SMARTLAB (WP1). It will guide the development and demonstration of SMARTLAB infrastructure and DIY toolkits (WP2), the development of use cases for the exploration of the SRI (WP3), and the demonstration of smart services (WP4). Its implementation will be supported by communication, dissemination and exploitation activities (WP7), utilising SMARTLAB's communication resources to ensure

effective communication with target stakeholders. The outcomes of Living Lab implementation will include the generation of data and insights to inform policy (WP6). Engagement activities and events will be reported in WP1-D6: SMARTLAB Playbook of Engagement Activities and Events (Part I) and WP1-D7: SMARTLAB Playbook of Engagement Activities and Events to Support Replication (Part I+II).

The *Plan for Stakeholder Engagement and SMARTLAB Journeys Including a SMARTLAB Calendar of Events* described in this document is structured as follows:

Chapter 2. The SMARTLAB Living Lab introduces the Living Lab approach, the SRI, and SMARTLAB project objectives. Three Living Lab phases of innovation are proposed, and the Limerick context for implementation described.

Chapter 3. SMARTLAB Journeys and Calendars describes the organising structure for engagement activities. This chapter presents the key SMARTLAB stakeholder groups and outlines the stakeholder Journeys envisioned for those who participate. The SMARTLAB Calendar clarifies the timeline of project activities and connected data gathering milestones.

Finally, the **Annex** contains a template to support the detailed design of engagement events.

2 The SMARTLAB Living Lab

This section describes the Living Lab approach adopted in SMARTLAB project implementation. It first introduces the Living Lab methodology and the SRI. Then, how SMARTLAB project objectives will be addressed through Living Lab implementation is outlined and three SMARTLAB innovation phases are proposed. Limerick's Living Lab and the local context for implementation is then described.

2.1 Introducing Living Labs

Living Labs are open innovation ecosystems in real-world environments. They use iterative feedback processes throughout the lifecycle of an innovation to create impact, and to support the co-creation of sustainable solutions. A Living Lab can be both a physical place and a way of working - a methodology. Living Labs focus on co-creation, rapid prototyping, and scaling-up innovations and businesses, providing different types of value to the stakeholders involved. In this context, Living Labs operate as intermediaries or orchestrators among citizens, research organisations, companies, and government agencies. They have many different real-world implementations but share common elements that form the foundation of the Living Lab approach (Malmberg et al., 2017).

Living Labs evolved in Europe from the mid-twentieth century onwards, emerging from different strands of activity including the participatory design movement in Scandinavia in the 60s and 70s, social experiments around information technology in the 80s, and Digital City projects in the 90s (Introducing the European Network of Living Labs - ENoLL and its Living Lab Community, 2016). They have been described as a methodology that can address complex problems through collective, yet uncoordinated, actions and interactions of communities of individuals (Ballon et al., 2005). They have antecedents in thinking on open innovation, including von Hippel (1988) on driving innovation through an emphasis on lead users, and Silverstone (1993) on the struggle between users and technology, as users take control of the technological artefact and integrate it into their day-to-day lives.

As the methodology has evolved in many application contexts, Living Labs are now recognised as containing the following common elements (Figure 1):

- Real-life setting - enabling comprehensive understanding of the innovation context.
- User engagement - engaging potential users of an innovation in the process of innovation from an early stage.
- Multi-stakeholder participation - engaging with stakeholders from across society including, citizens, government, business, and academia/research.
- Multi-method approach - combining a range of participant-centric co-creation methods to meet the objectives of the Living Lab.
- Systematic co-creation - positioning users and other stakeholders as co-innovators, contributing to the innovation process.

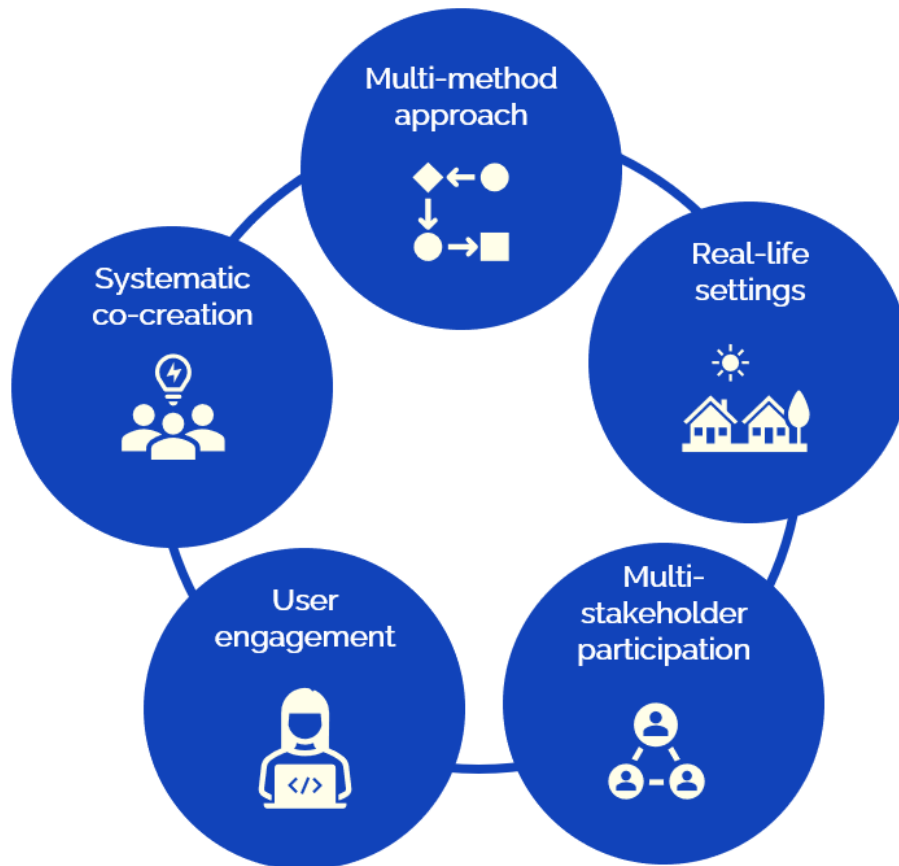


Figure 1. Common elements in the Living Lab ecosystems (Adapted from Malmberg et al., 2017, p. 11).

Drawing on the quadruple helix stakeholder model - where innovation system stakeholders from academia, industry, government, and civil society are engaged in multi-layered, dynamic interactions - Living Labs place emphasis on the importance of actively engaging civil society actors in processes of innovation (Schütz et al., 2019).

2.2 The Smart Readiness Indicator

The EU SRI rates and communicates the smart readiness of buildings. Developed through assessing the potential of a building or building unit to adapt its operation to the needs of occupants, and of the smart electricity grid, it is intended to improve a building's energy efficiency and performance in use. The SRI focusses on three areas:

- building energy performance and operation
- response to the needs of building occupants
- energy flexibility, including the ability of the building or building unit to participate in demand response. This is where, to balance the energy grid, energy users adjust energy demand in response the available energy supply.

The SRI is based on a set of smart readiness scores calculated using a common EU methodological framework, which may be adapted through linking it to a building's energy performance calculation. It is communicated using an SRI certificate. The certificate is to

include a building or building unit’s smart readiness rating and smart readiness scores. Where possible, additional detail on the building’s connectivity, on cybersecurity of systems and interoperability, and on data protection should be included (European Commission, 2020).

In addition to communicating to building users and owners the potential of advanced smart technologies to increase energy savings and to decarbonize the energy system, additional features can be included in the SRI to reflect enhanced inclusiveness and accessibility, comfort, and wellbeing (Figure 2). As an optional scheme, EU member states can choose to implement the SRI in specific areas or for particular building types (European Commission, 2020).



Figure 2. Expected advantages of smart technologies in buildings (Source: European Commission, 2020, p. 2).

2.3 Delivering SMARTLAB Objectives through a Living Lab

The SMARTLAB team will work with cross-sectoral stakeholders in the real-world context of Limerick’s Decarbonisation Zone (LDZ) to achieve SMARTLAB project objectives. The Citizen Innovation Lab and Fab Lab Limerick will provide a physical location for project engagement events and technology demonstrators. The project will develop policy guidance relevant to SRI implementation in Ireland through analysis of quantitative data generated by SMARTLAB sensor installations, and qualitative data gathered through interactions with project participants, members of the Policy Fora, and other relevant stakeholders. Table 1 illustrates the core objectives of the SMARTLAB project and the implementation plans that are designed to achieve them.

Table 1. SMARTLAB Project Objectives.

SMARTLAB Core Objective	Living Lab Implementation
Explore SRI Potential	Develop a framework for smart building upgrades linked to the SRI and mapped to use cases, developed through analysis of participant personas and building typologies in Limerick.
Empower Smart Energy Citizens	Develop a framework for data governance through co-creation with participants and other stakeholders to enable a range of data privacy preferences - public, shared, and private. Empower smart energy citizens through a variety of engagement methods and co-creation activities to: <ul style="list-style-type: none"> • Increase participant understanding of the SRI; • Demystify sensor technology; • Build capacity for DIY installations, and • Explore the potential for additional smart services.
Deploy Smart Infrastructure	Specify and deploy city-scale infrastructure in Limerick to support enhanced uptake in smart building technologies and services; comparing Lower Power Wide Area Network (LPWAN) and Narrowband Internet of things (NB IOT) solutions and <ul style="list-style-type: none"> • Demonstrate building-scale smart technology and software infrastructure, and • Develop a DIY approach for building owners
Create Smart Buildings	Create a framework for 'smart' building upgrades for broad application - including for THBs and other complex buildings that are constrained due to building use and fabric or through legislative protection - using a range of use cases. Define 'smart' for a range of experiences identified through participant engagement and analysis of building types and patterns of use.
Validate Smart Services Potential	Through uptake of smart technologies that can ensure better energy performance and greater comfort and well-being, validate the potential for smart services including: <ul style="list-style-type: none"> • demand side management. • automated control solutions using off the shelf systems. • Augmented Intelligence dashboards to deliver energy and non-energy services to a wide range of different building stakeholders (owners, occupants, tenants, residential, commercial etc.)

2.4 SMARTLAB Innovation Phases

The SMARTLAB innovation process proposed is drawn from established Living Lab methodology (Malmberg et al., 2017) and is structured as three phases (see Figure 3).

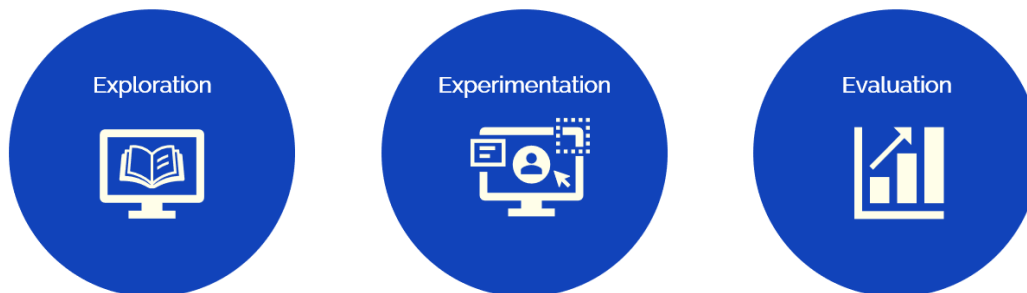


Figure 3. Phases of innovation process (Malmberg et al., 2017).

These phases can apply to particular activities within the project and also to the SMARTLAB project as a whole as described below:

1. **Exploration:** This phase is understood as early work undertaken within a project to understand the current state of the project focus in order to begin designing possible future states (Malmberg et al., 2017). Within SMARTLAB, this stage includes desk-based research on smart-readiness and on the SRI, and the initial exploration of sensor technology with Limerick's maker community, all of which inform the experimentation phase. It also includes work undertaken by the project team to secure funding, to establish the parameters of the project plan, to gain research ethics approval to commence engagement activity and to prepare the project data management plan.
1. **Experimentation:** This phase includes real-life testing of one or more proposed future states (Malmberg et al., 2017). The SMARTLAB launch events initiate this phase and spread word of the project to targeted stakeholders in Limerick and to a wider community of policymakers and researchers. Participant Journeys will begin with the signup and consent process, demystification workshops, access to online resources, and the installation of sensors in participating buildings. This phase will test a potential future state of increased building smartness, where buildings are activated by sensors, and the data they transmit is analysed and shared with a community of building owners and occupants.
2. **Evaluation:** This phase seeks to assess the impact of the experiment with regards to the current state and to iterate a future state (Malmberg et al., 2017). Evaluation occurs throughout project implementation and is concurrent with the experimentation phase. This phase includes the orchestration of sensemaking and learning loops with project stakeholders to support the iterative process of innovation. It will include periodic reviews of project progress towards objectives and milestones, timed to integrate with the SMARTLAB reporting cycle and Policy Fora. SMARTLAB will adapt an evaluation model drawn from the FormIT project which concentrates on assessing adherence to core Living Lab principles of value, influence, sustainability, openness, and realism (Ståhlbröst & Holst, 2012). As well as the periodic evaluation just described, project deliverable WP1-D7 will include

evaluation of overall SMARTLAB Living Lab implementation. (See Figure 12 - SMARTLAB calendar of engagement activities)

2.5 Limerick's Living Lab

A Living Lab has been in operation in Limerick since 2018, initiated through implementation of the +CityxChange (Positive City Exchange) H2020 project. +CityxChange explores the development of a structured approach to city clean energy transitions through the co-creation and replication of Positive Energy Blocks and Districts. A Positive Energy Block (PEB) involves a group of buildings cooperating around how they use energy, so that over the course of a year they generate more energy from local renewable energy sources than they consume.



Figure 4. The Limerick Digital Twin accessed via the Citizens' Observatory in the Citizen Innovation Lab.

The +CityxChange project developed digital tools and stakeholder engagement frameworks for the co-creation of PEBs, and explored electricity grid innovations to enable peer-to-peer trading between PEB buildings. +CityxChange demonstrator projects in Limerick highlighted the need to transform how buildings manage their energy use and increased awareness of the role of smart buildings in decarbonising the energy system (Figure 4).

The +CityxChange frameworks and resources which will be built upon through SMARTLAB project implementation include:

- The Limerick Digital Twin and Decision Support Tool provides the cloud-based location where sensor data is stored and analysed.
- The Citizen Innovation Lab, located in Limerick's Decarbonisation Zone, comprises a physical space - the Citizens' Observatory, Engagement Hub, and Fab Lab Limerick;

a digital platform - <https://citizeninnovationlab.ie/>; and a programme of engagement. It operates as a collaborative platform focused on decarbonisation and sustainable digitalisation and creates a space where people can work together on activities to help shape a sustainable future for the city (Fitzgerald et al., 2020). The Citizen Innovation Lab is the primary location of stakeholder engagement activities in the SMARTLAB project.

- The Citizen Participation Playbook designed to support city authorities to work effectively with local communities to advance the clean energy transition (Burón-García & Sánchez Mora, 2020) includes a portfolio of participatory processes to support the co-design of PEBs. Although the processes are not directly applicable to the work of SMARTLAB, as SMARTLAB is supported but not led by the local authority in Limerick, engagement activity will be informed by the open innovation approach described.
- The preliminary Innovation Playground (Mee & Crowe, 2020; Walsh et al., 2022) is a form of city-as-living-lab initiated by +CityxChange in the Georgian core of Limerick city centre. It is now incorporated into Limerick’s Decarbonisation Zone, the geographically defined focus of clean energy innovation activities in the city and the target area for SMARTLAB implementation.
- An open innovation ecosystem focussed on Limerick’s clean energy transition and orchestrated through the Citizen Innovation Lab programme of engagement was initiated through +CityxChange (Walsh et al., 2022). This will be leveraged during SMARTLAB implementation and a preliminary map of the SMARTLAB innovation ecosystem is illustrated in Figure 5.

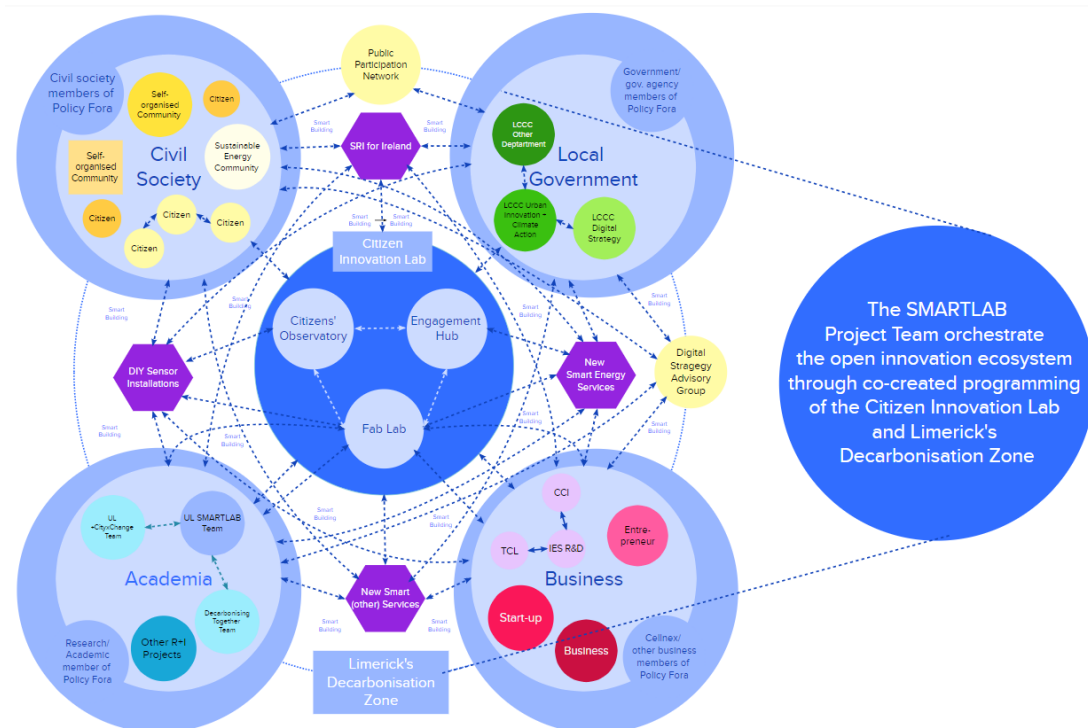
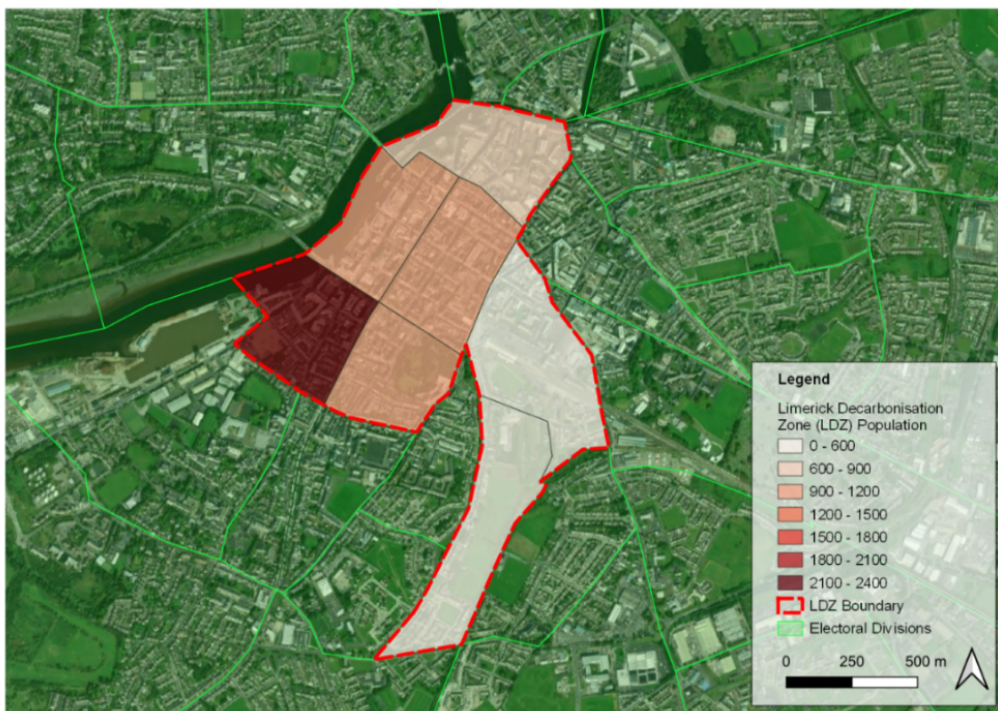


Figure 5. Preliminary map of the SMARTLAB open innovation ecosystem with Decarbonisation Zone and Citizen Innovation Lab.

SMARTLAB will build on Limerick’s CityxChange experience, continue its citizen focus and build upon the +CityxChange frameworks and tools described.

2.6 Local Context

The target area for SMARTLAB implementation is the Limerick Decarbonisation Zone (LDZ) located in the centre of Limerick city (Map 1). The LDZ was proposed by Limerick City and County Council (LCCC) in response to Action 165 of Ireland’s Climate Action Plan 2019 (Government of Ireland, 2019). It includes the historic Georgian Neighbourhood containing many traditional and heritage buildings (THBs), some dating from the late 1700’s. The northwest of the LDZ bounding the River Shannon includes a large number of purpose-built apartment buildings. The southeast section includes Colbert Station and its associated redevelopment site.



Map 1. The Limerick Decarbonisation Zone shown shaded and surrounding Electoral Divisions in outline (Elaborated by the authors with data from the Central Statistics Office, 2016).

Census figures from 2016 indicate a population of 7,127 people living in the LDZ (Central Statistics Office, 2016). Among those, 56% were born in Ireland and 44% were born elsewhere. Of the total, just under half (47%) are between 25 and 44 years old as illustrated in Figure 6.

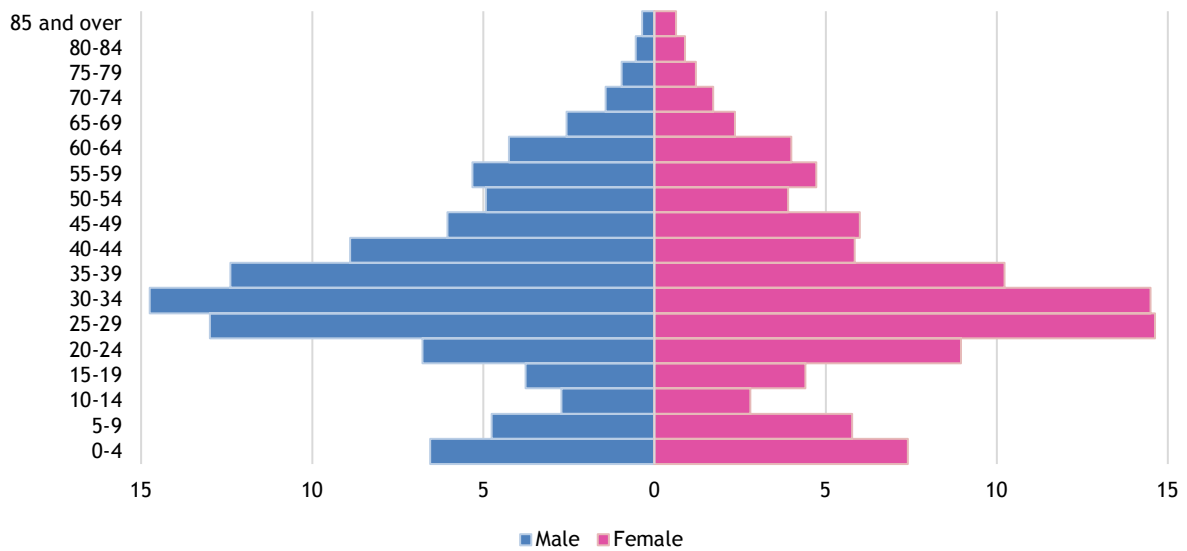
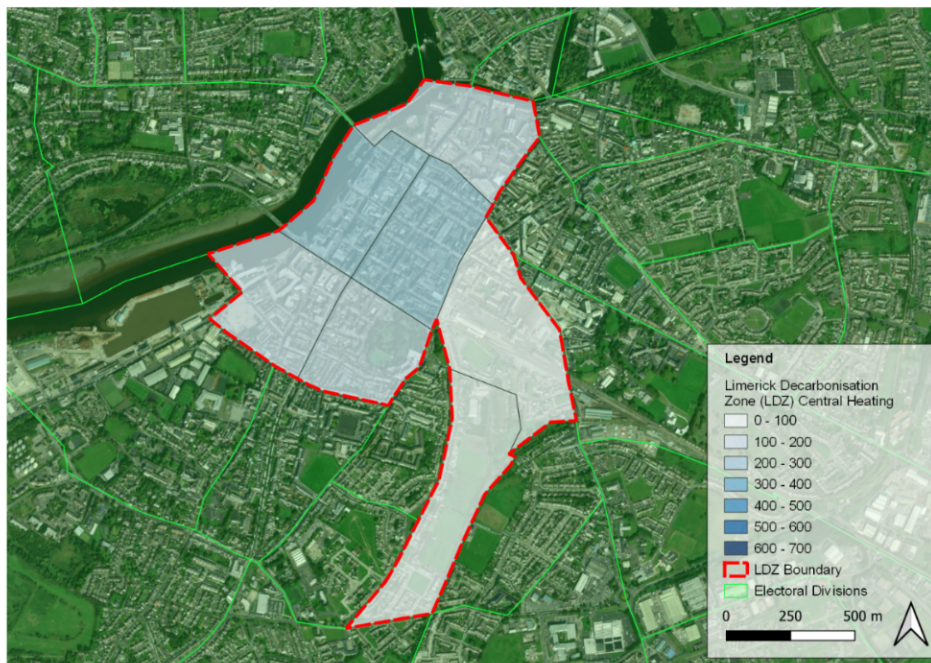
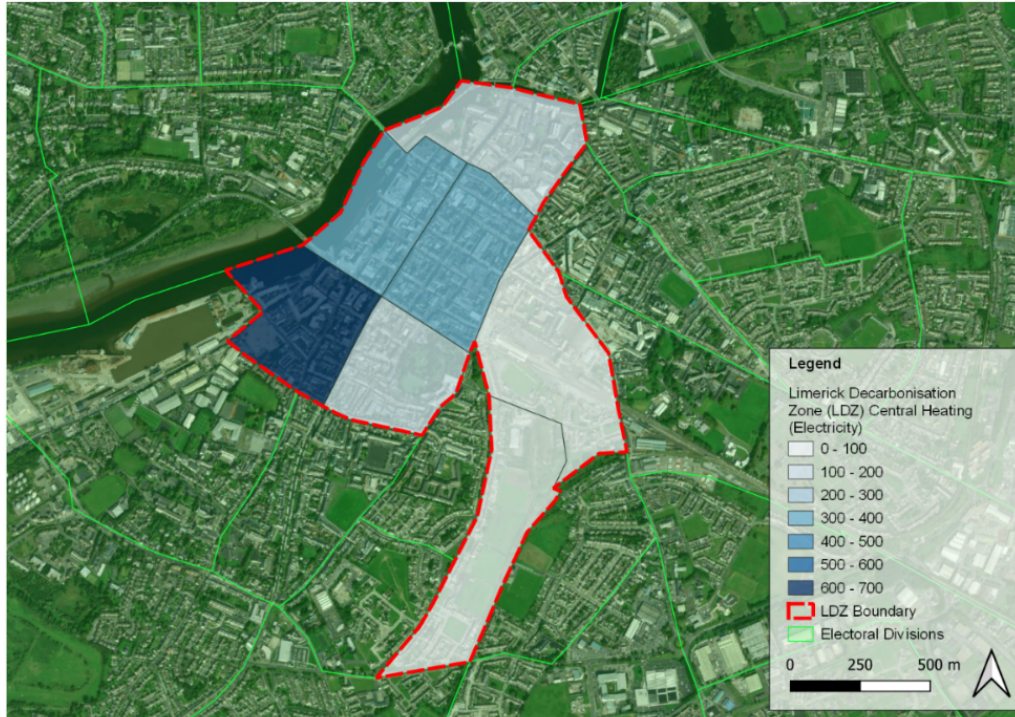


Figure 6. Percentages of the population by sex and age living in the Decarbonisation Zone (Elaborated by the authors with data from the Central Statistics Office, 2016).

In the LDZ, census data reveals that around 1,070 properties use oil, natural gas, coal, peat, LPMG or wood as a source of energy (Map 2). 1,667 properties use electricity for central heating (Map 3), and they are mostly in the southwestern, and central part of the study area.



Map 2. Properties that use oil, natural gas, coal, peat, LPMG and wood for central heating in the Limerick Decarbonisation Zone (Elaborated by the authors with data from the Central Statistics Office, 2016).



Map 3. Properties with electrical central heating in the Limerick Decarbonisation Zone (Elaborated by the authors with data from the Central Statistics Office, 2016).

The project team includes partners familiar with Limerick city and with established working relationships with key stakeholders within the project demonstration area. The project will build on networks forged throughout +CityxChange to connect with relevant communities and their representatives, and forming a well-grounded platform for engagement. Also, relevant to this report is the SMARTLAB *Communication, Dissemination and Exploitation Plan 1* (WP7-D1), which includes analysis of key target groups within the city, as well as methods for communicating with them.

3 SMARTLAB Journeys and Calendars

This section sets out the plan for stakeholder engagement using SMARTLAB Journeys and an outline Calendar of Events, which structure orchestration of the SMARTLAB Living Lab. Engagement will focus on three specific stakeholder groups (Figure 7):

- Project participants - people who will participate in the project and have sensors installed in their building
- Policy makers - people involved or interested in policy development in areas relevant to the adoption of the Smart Readiness Indicator (SRI) in Ireland
- Other stakeholders - community and business groups and other stakeholders whose perspectives will contribute to project implementation and results

As the SMARTLAB project will comprise 50-100 buildings in one city, the project will depend on engagement and data collection at this scale to make significant recommendations based on project implementation. As such, interactions with project participants must be targeted and carefully planned.

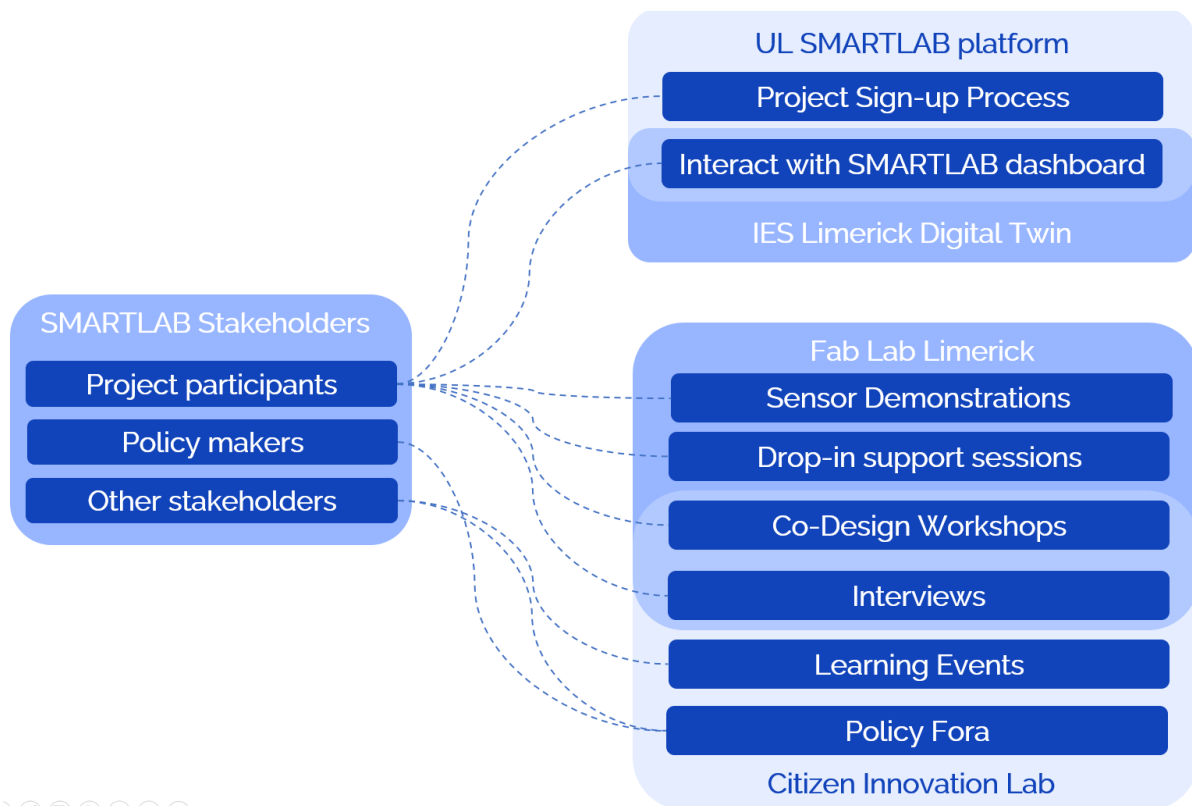


Figure 7. SMARTLAB stakeholders and data gathering locations (digital and physical spaces).

Figure 7 outlines the different types of stakeholders the SMARTLAB project will engage. It describes methods for engagement and the platforms the project will use. Stakeholders, as described above, will mostly comprise project participants, those who agree to have sensors installed in their buildings and who interact with the project to learn about their building data. A smaller group will include policy makers and those who take part in the Policy Fora.

Other stakeholders will include those who have useful insights and contributions to share with the project without necessarily taking part in stakeholder Journeys. We anticipate that this category will include representatives of the business and community sectors in Limerick, for example.

The platforms the project will use are both digital and real-world locations. Digital spaces crucial to project activities include the UL SMARTLAB platform - comprising the SMARTLAB project website and the UL Qualtrics tool - and the IES Limerick Digital Twin which will host private dashboards for individual participant and aggregated local building data. The Citizen Innovation Lab, which is co-located with Fab Lab Limerick, will be the primary physical space for project engagement, hosting the numerous in-person activities of the project including sensor demonstrations, co-design workshops, learning events, and Policy Fora. The methods to be used will be designed in detail as the project progresses and a template for this is included in Annex A.

3.1 Project Participants

Project participants will include building owners and occupants within the target implementation area, the Limerick Decarbonisation Zone (LDZ). These could include people living in rented accommodation within the area, those living in an owner-occupied building, landlords (single dwelling or large-scale), or owners and managers of buildings for non-residential or mixed uses including offices, retail, and government and cultural organisations.

A baseline level of project interaction will involve participants agreeing to install sensors in their buildings and to sharing sensor data with the project team, reviewing the analysed data through a private dashboard interface in the Limerick Digital Twin, and potentially making decisions based on this analysis. The SMARTLAB team, aware of the plurality of potential participant needs and approaches, have designed a series of generic participant Journeys to structure interaction with the project. These Journeys cover three core stages of SMARTLAB participation:

- Recruitment (Figure 8)
- Sensor Installation (Figure 9)
- Demonstration (Figure 10)

The Recruitment Journey (Figure 8) begins when a potential participant first hears about SMARTLAB and expresses interest in learning more or getting involved. A suite of communications approaches delineated in the Communication, Dissemination and Exploitation Plan (WP7-D1) will be deployed to share information about the project through various avenues. These will be supported by a mixture of digital and in-person resources to allow potential participants to develop a clear understanding of project objectives, how they can become involved, and why they should participate. Full information about the project will be shared through the project website and associated social media channels, and a series of drop-in sessions will be hosted to cater for anyone wishing more in-person interaction with the project team. Sensor demonstration workshops will also be available

to increase knowledge levels on the capabilities of the SMARTLAB sensors and to provide more information to anyone concerned about data privacy. The sign-up process will include agreement to data privacy consent procedures which will give participants full control of the data they share within the project.

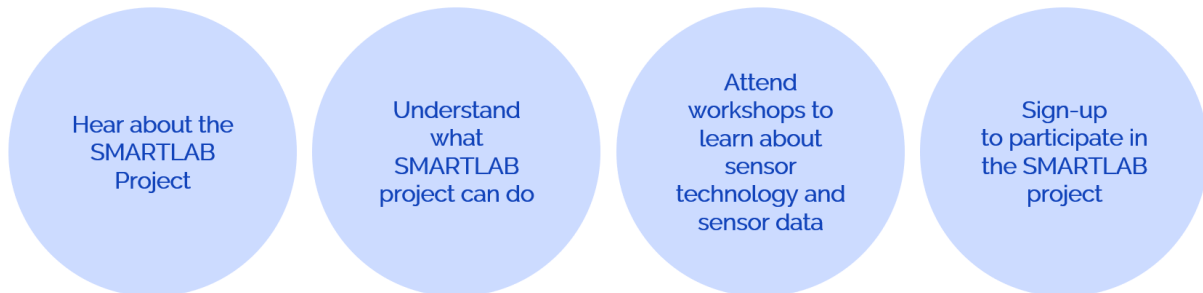


Figure 8. SMARTLAB Participant Journey: Recruitment

As shown in Figure 9, the project will offer participants two pathways for sensor installation - either to install sensors themselves or to have the sensors installed by project partners The Convex Lens (TCL). It is anticipated that most participants will prefer to have their sensors professionally installed. At the same time the project will support participants - perhaps those with more technical knowledge - to learn how to install sensors themselves. The project team has chosen sensors which are relatively simple to install, requiring no electrical expertise, but participants will still need guidance on the correct installation technique and location(s) for best sensing capability.

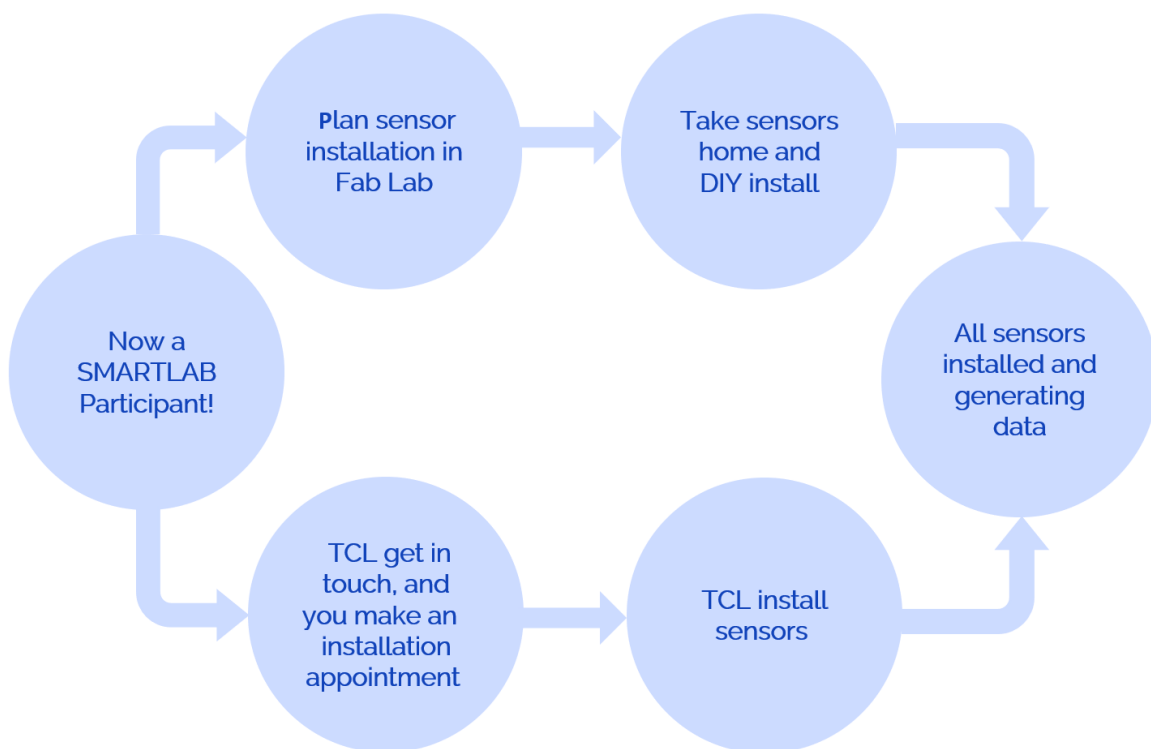


Figure 9. SMARTLAB Participant Journey: Sensor Installation.

Once sensors are installed, the project team will complete checks to ensure that the sensors are functional and recording useful data. It is at this point that the ‘sensing year’ begins - the period of twelve months when each participant will have sensors recording data in their building. This is the experimentation phase (see Figure 3) of the SMARTLAB Living Lab, and is described from the perspective of the participant as a SMARTLAB Journey in Figure 10 below.

This Journey is not the only possible pathway for participation. It is expected that some participants will be more actively involved and responsive whereas others will simply have sensors installed and monitor sensor data themselves, without engaging regularly with project activities or with the project team.

The project team will prepare and share a SMARTLAB Guide for Participants. This guide will give participants support to understand how their data is displayed and analysed, and will contain instructions on how to navigate the SMARTLAB dashboard. This guide will also share access to other supports and information relevant to the project, including how to contact the project team.

The SMARTLAB Journey described below indicates that once sensors are installed and building data is being collected, participants can log into their private sensor data space in the dashboard and begin monitoring their own sensor data. They will be prompted through the dashboard interface to share their experience through the project platform at various points during the sensing year in a SMARTLAB Diary. We anticipate prompting participants to share insights during M11 (to collect initial impressions), M13 (to capture progress), M16 (ahead of further support events in M17), M19 and M22 to collect reflections on any interventions made.

Throughout this phase, invitations will be shared with participants to join in further project activities including stakeholder focus groups and Policy Fora. These activities will focus on the SMARTLAB use cases identified in *Catalogue of Use Cases (WP1-D4)*. At the end of the experimentation phase, sensors will be removed from participants’ buildings.

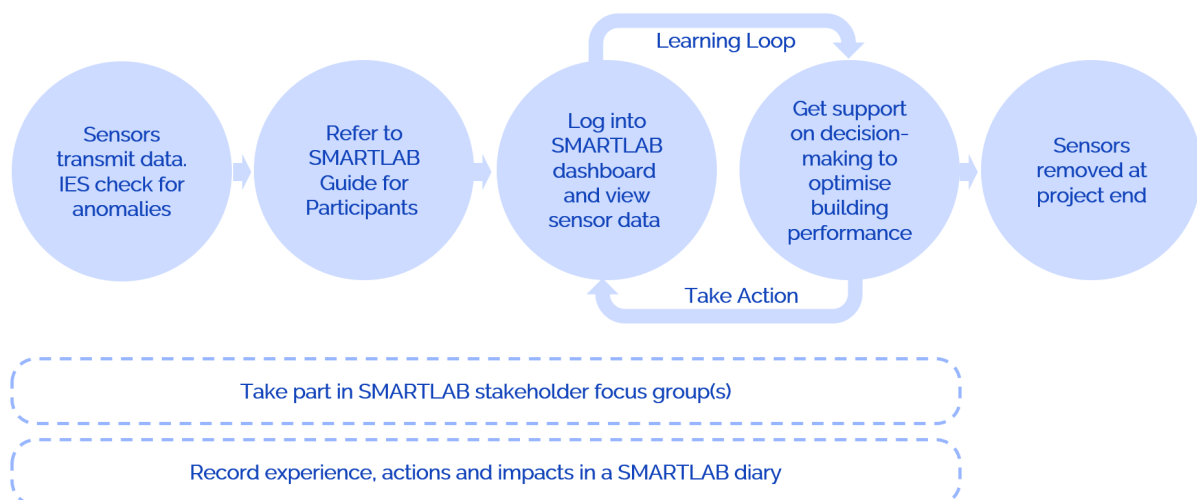


Figure 10. SMARTLAB Participant Journey: Demonstration of energy management/other smart services.

3.2 Policy Fora

There are two core policy related objectives within the SMARTLAB project: policy recommendations to enable wider deployment of smart systems/programmes in Ireland (WP6-O2), and policy recommendations on improving city-scale infrastructure to enable uptake of smart technologies and services across Ireland (WP6-O3).

Policy Fora will be convened within the project timeline to allow relevant stakeholders to share expertise with the project team and to reflect on data generated through project activities (Figure 11). The Policy Fora form a series of iterative learning loops where sensemaking of SMARTLAB data and stakeholder observations can generate cross-sectoral insights relevant to SRI implementation and policy development. Policy Fora will be held in M12, M18, and M22 of the project, once project data collection and engagement activities are well established.

The Policy Fora Journey is described in Figure 11. Having accepted an invitation to participate, members of the Policy Fora will be briefed on SMARTLAB objectives and the policy context surrounding smart systems and technologies in Ireland will be explored, particularly in relation to the development of the SRI at European level. Then, the group will review initial and then developed project results and policy guidance with the SMARTLAB project team. Policy Fora insights will contribute to the final policy recommendations published at the end of the project.



Figure 11. Stakeholder Journey - Policy Fora.

3.3. SMARTLAB Calendar

Figure 12 assembles the different stakeholder Journeys within the project timeline as orchestrations of the SMARTLAB Living Lab.

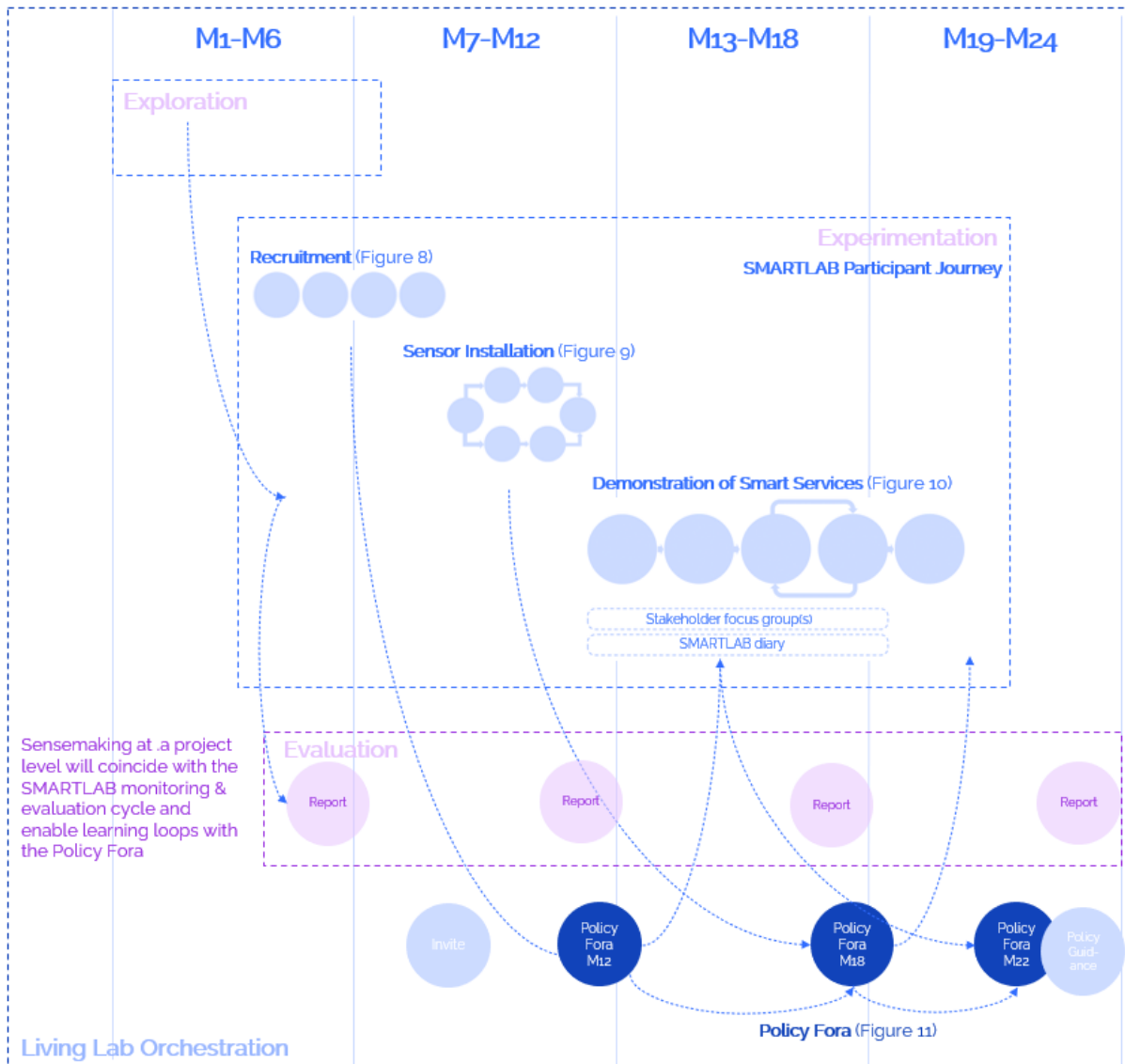


Figure 12. SMARTLAB calendar of engagement.

Table 2 gives a detailed overview of SMARTLAB engagement and data collection objectives. This table will be used by the project team to highlight activity deadlines and to inform detailed event planning (see Annex A: Event Template). The rationale for the table is to identify the work needed to inform each relevant Deliverable, and so Deliverables, deadlines, Deliverable leads, and information sources are made clear. The kind of data

needed is listed next, followed by a detailed plan for the sequential engagement methods that will be used to generate data and inform the project.

Table 2. WP deliverables, tasks, and engagement methods.

WP deliverables, deadline, lead & source group	Data to be collected	Engagement method and details
<p>WP1-D2: User understanding, engagement, and response to smart buildings</p> <p>M23</p> <p>Lead: UL</p> <p>Source: Project participants including focus groups</p>	<p>T1.2: Understand the meaning of ‘smart’ with respect to different citizen/end user experiences and determine how occupants engage and respond to smart systems.</p>	<ul style="list-style-type: none"> • M4-M7 - Workshop and drop-in sessions will collect qualitative data about participants’ understandings of smart technologies and introduce the SRI and sensors technology. • M4-M7 - Sign up process for participation in SMARTLAB will include a questionnaire to establish a baseline on participant understandings of ‘smart’. • M8-M10 - Sensor installation • M11-M22 - SMARTLAB Dashboard will allow participants to see sensor data while the sensors are transmitting data, and will also gather data on participant experience in SMARTLAB Diaries. • M11-M22 - Interviews and focus groups discussions will gather data on participant experiences with the sensors from a range of participants and use cases. • Outputs will be considered in Policy Fora.
<p>WP1-D3: Barriers to improving smartness of buildings and associated barriers to deployment of smart tech and services.</p> <p>M6</p> <p>Lead: UL</p> <p>Source: Project participants, project partners and stakeholders</p>	<p>T1.3: Identify the barriers with respect to improving the smartness of buildings and the associated barriers to the deployment of smart technologies and services.</p>	<ul style="list-style-type: none"> • M4-M6 - Workshop and drop-in sessions will collect qualitative data about barriers to improving the smartness of buildings and associated barriers to the deployment of smart technologies and services. • M4 - Internal meeting/workshop with project partners to scope technical barriers to improving the smartness of buildings and associated barriers to the deployment of smart technologies and services. • M5 - Stakeholder Launch Event will gather initial data on barriers to improving the smartness of buildings and associated barriers to the deployment of smart technologies and services from potential participants. • Outputs will be considered in Policy Fora.

WP deliverables, deadline, lead & source group	Data to be collected	Engagement method and details
<p>WP1-D4: Catalogue of use cases</p> <p>M6</p> <p>Lead: UL</p> <p>Source: Project partners</p>	<p>T1.4: Generate a number of use cases, which will be utilised across all WPs to ensure solutions are designed with the end user in mind.</p>	<ul style="list-style-type: none"> • M4-M5 - Sensemaking Workshops with project partners to explore and define use cases. • Outputs will be considered in Policy Fora.
<p>WP1-D5: List of Buildings</p> <p>M7</p> <p>Lead: UL</p> <p>Source: Project participants</p>	<p>T1.5: Identify the buildings to be included in the demonstration and monitoring and evaluation activities in WP4 and WP5.</p>	<ul style="list-style-type: none"> • M4-M7 - Sign up process will gather data on potential participants and buildings and map against the SMARTLAB use cases to identify the list of buildings.
<p>WP2-D2: Approved list of sensor devices to match the data requirements under the SRI and enable smart building monitoring across the living lab including through DIY kits.</p> <p>M7</p> <p>Lead: TLC</p> <p>Source: Project partners</p>	<p>T2.2: Investigate the available off the shelf infrastructure for buildings to improve their smart readiness and enable them to avail of such smart services including affordable DIY toolkits that non-experts can deploy.</p> <p>T2.3: Based on the different use cases developed in WP1 address the technical and financial challenges to both city-scale and building level objectives and specifications for the city-scale infrastructure, DIY toolkits and associated software infrastructure.</p> <p>T2.4: Specification of software infrastructure ecosystem for building owners, available, emerging, and new. communication protocols to be developed and produced.</p>	<ul style="list-style-type: none"> • M1-M7 - Internal meetings/workshops take place to decide what sensors and software infrastructure are the most suitable, and the technical and financial challenges to project objectives. (-->D6.3) • (From WP1D3) M4-M6 - Workshop and drop-in sessions will collect qualitative data about barriers to improving the smartness of buildings and will include questions on financial challenges. • Work of T2.3 feeds into WP3-D1&WP3-D2 • Outputs will be considered in Policy Fora.

WP deliverables, deadline, lead & source group	Data to be collected	Engagement method and details
<p>WP3-D1: Review of the SRI and other appropriate systems for measuring the ‘smartness’ of a building and requirements for data monitoring and DIY toolkits as a result</p> <p>M3</p> <p>Lead: IESRD</p> <p>Source: Project partners</p>	<p>T3.1: Explore the various levels of systems and programmes for enabling smart buildings such as the Smart Readiness Indicator (SRI) and other initiatives such as Wired Score.</p> <p>T3.2: The SRI has the most potential due to its drive from the EU and will be the core focus, however a watch function on other initiatives identified will be enabled to ensure future proofing of any recommendations. Based on this review, the data monitoring requirements will be determined and fed to the specification of the DIY toolkits in WP2.</p>	<ul style="list-style-type: none"> • M1-M3 - Internal meetings/workshops with the project partners to explore the application of the SRI and resulting data monitoring requirements. • Outputs will be considered in Policy Fora.
<p>WP3-D2: Framework for upgrading the SRI of existing buildings linked to DIY toolkits for building owners and operators, taking into account different building types and complexities.</p> <p>M6</p> <p>Lead: IESRD</p> <p>Source: Project partners</p>	<p>T3.3: Develop a framework for how to upgrade the SRI of buildings with respect to the different use cases outlined in WP1.</p> <p>T3.4: Ensure all technical and financial challenges as outlined in WP2 can be addressed. Create a framework for complex buildings, such as THBs or others identified in WP2 to ensure no building type is excluded.</p>	<ul style="list-style-type: none"> • M3-M6 - Internal meetings/workshops to discuss how to upgrade the SRI of buildings, and to make sure that technical issues will be minimum. • Outputs will be considered in Policy Fora.
<p>WP4-D2: Report on the outcomes of service provision enabled by smart building data in line with the SRI benchmarks and assessments of</p>	<p>T4.4 & T4.5: Deploy available smart services from project partners to demonstrate</p> <p>How improving building SRI can enable both energy and</p>	<ul style="list-style-type: none"> • M4-M7 - Sign up process for participation in SMARTLAB will stream interest in relevant smart services for testing • (As in WP1-D2) M11-M22 - SMARTLAB Dashboard to collect participant experience in SMARTLAB Diaries, make recommendations for improvements.

WP deliverables, deadline, lead & source group	Data to be collected	Engagement method and details
<p>viability at a national level.</p> <p>M24</p> <p>Lead: IESDR</p> <p>Source: Project participants, project partners, and focus group</p>	<p>non-energy services. This will include:</p> <ul style="list-style-type: none"> • utilising energy dashboards and Digital Twins to monitor building energy performance (in THBs verify using in-situ u-value monitor), identify faults and make recommendations for energy improvements including heating controls (existing IES technology), • demonstrating potential for automated control using available off-the-shelf systems and demonstrating potential for non-energy services (fire, comfort, and well-being) in line with the SRI and building on the output from the LCCC/TCL SBIR project. 	<ul style="list-style-type: none"> • (As in WP1-D2) M11-M22 - Interviews and focus groups discussions will explore potential for automated building controls with project participants. • Outputs will be considered in Policy Fora.
<p>WP5-D3: Final report on impacts to the buildings, the occupants, the smart energy system, and the future for smart building technology.</p> <p>M24</p> <p>Lead: IESRD</p> <p>Source: Project participants, and focus groups</p>	<p>T5.2: M&E to include a 3D model of the demonstration zone with a dashboard monitoring Key Performance Indicators such as improved SRI, improved energy, carbon, and comfort, associated hard and soft impacts of the proposed energy and non-energy services for the end users. The impact on the building owner will also qualitatively be assessed through the Living Lab and citizen engagement activities via WP1.</p> <p>T5.3: The impact on the overall energy system (positive and negative) will also be assessed and used to feed the policy objectives in WP6.</p>	<ul style="list-style-type: none"> • M7 - Qualtrics portal for participants to upload energy bills • (As in WP1-D2) M11-M22 - SMARTLAB Dashboard will allow participants to see sensor data, but also will gather data to assess impacts while the sensors are transmitting data via SMARTLAB diaries. • (As in WP1-D2) M11-M22 - Interviews and focus groups to gather data on impact to building users/owners of analysis of their building data.

WP deliverables, deadline, lead & source group	Data to be collected	Engagement method and details
<p>WP6-D1: Framework for data governance and ethics.</p> <p>M24</p> <p>Lead: UL</p> <p>Source: Project participants, project partners and focus groups</p>	<p>T6.1: Create a framework for data governance and ethics to enable data use across three strands, public, community and business - linked to WP1 use cases - to enable the delivery of public and private shareable datasets in a GDPR compliant format.</p> <p>Include guidance and communication protocols for data, and specifications for data control and GDPR.</p> <p>Utilise WP1 co-creation approach to explore which data can be:</p> <p>(i) publicly displayed to disseminate results and encourage uptake from others;</p> <p>(ii) shared between community groups to enable education, learning and co-creation of ideas;</p> <p>(iii) shared with service providers offering energy and non-energy services.</p> <p>Respective data agreements will also be created.</p>	<ul style="list-style-type: none"> • M8-M10 - Internal meetings/workshops with the project partners on state of the art. • M11-M22 - Interviews and focus groups linked to WP1 use cases, to gather participant perspectives on data use across three strands, public, community and business. • M12 - Policy Fora consider current state. • M18 - Policy Fora sensemaking of qualitative data and consider future state. • M22 - Policy Fora reviews draft framework.
<p>WP6-D2: Policy recommendations for deployment of SRI in Ireland.</p> <p>M24</p> <p>Lead: UL</p> <p>Source: Project partners, focus</p>	<p>T6.2: Based on WPs1-5 outcomes, policy recommendations for deployment of indicators such as the SRI/other as determined by the watch-function in WP3 will be made to enable the update of smart technologies and services across Ireland.</p>	<ul style="list-style-type: none"> • Carry forward insights from the following engagement activities: <ul style="list-style-type: none"> ○ WP3D1: M3 - Internal meetings/workshops ○ WP3D2: M3 - Internal meetings/workshops ○ WP5D3: M6-M22 all activities • M8-M10 - Internal meetings/workshops with project partners on policy insights from WP1-5 • M10-M22 - Policy Fora to analyse outcomes from WPs1-5 and propose

WP deliverables, deadline, lead & source group	Data to be collected	Engagement method and details
<p>groups, and policymakers</p>		<p>policy recommendations at national level to adopt the SRI.</p> <ul style="list-style-type: none"> ○ M12 - Policy Fora consider current state and policy context. ○ M18- Policy Fora sensemaking of qualitative data and consider future state. ○ M22- Policy Fora reviews draft framework <ul style="list-style-type: none"> ● M11-M22 - Interviews and focus group discussions linked to WP1 activity, gathering participant data on gaps in smart services provision.
<p>WP6-D3: Policy recommendations for improving city-scale infrastructure to enable uptake of smart technologies.</p> <p>M24</p> <p>Lead: UL</p> <p>Source: Project partners, focus groups, and policymakers</p>	<p>T6.3: Develop policy recommendations for improving city-scale infrastructure to enable uptake of smart technologies and services.</p>	<ul style="list-style-type: none"> ● Carry forward insights from the following engagement activities: <ul style="list-style-type: none"> ○ WP1D3: M4-7 all activities ○ WP2D2: M2-M7 - Internal meetings/workshops ○ WP5D3: M6-M22 all activities ● M10-M22 - Policy Fora to analyse outcomes from WPs1-5 and propose recommendations on city-scale infrastructure <ul style="list-style-type: none"> ○ M12 - Policy Fora consider current state and policy context. ○ M18- Policy Fora sensemaking of qualitative data and consider future state. ○ M22- Policy Fora reviews draft framework.
<p>WP7-D4: Catalogue of Services and New Business Models</p> <p>M22</p> <p>Lead: UL</p> <p>Source: Selected groups of local stakeholders</p>	<p>T7.3: Scope new business models for smart and connected buildings and using the SMARTLAB Journey developed in WP1, engage stakeholders including end users in the co-creation of a catalogue of smart building services (energy, smart aging, maintenance etc.).</p>	<ul style="list-style-type: none"> ● M10-M22 - Policy Fora to analyse outcomes from WPs1-5 and propose recommendations on city-scale infrastructure <ul style="list-style-type: none"> ○ M12 - Policy Fora consider current state and policy context. ○ M18- Policy Fora sensemaking of qualitative data and consider future state. ○ M22- Policy Fora reviews draft framework.
<p>WP8</p>	<p>None</p>	

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Annex A: Event Template

Event Title:	
Project Objectives Addressed	
Relevant KPI	
Date	
Event Organiser:	
Partners Required:	
Short Description: (For promotion)	
Detailed Description:	