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Plan of extending the life of the Living Labs beyond iSCAPE
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Plan of extending the life of the Living Labs beyond iSCAPE

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Short Description	This report outlines a strategic plan for extending the life of the iSCAPE Living Labs beyond the project. The plan was developed following a three-step approach which involved the assessment of the current state of the Living Labs, development of the sustainability objectives, and planning of the actionable initiatives. The report was produced as part of Task 5.4 and it forms Deliverable 5.5.		
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Abbreviations

ANT:	International Conference on Ambient Systems, Network and Technologies
ARPAE:	Regional Agency for Prevention, Environment and Energy of Emilia-Romagna, Italy
CArE-Cities:	Clean Air Engineering for Cities
CO:	Carbon Monoxide
ENoLL:	European Network of Living Labs
EPA:	Environmental Protection Agency
EPSRC:	Engineering and Physical Sciences Research Council
EU:	European Union
FCC:	Future Cities Catapult
FMI:	Finnish Meteorological Institute
GBC:	Guildford Borough Council
GCARE:	Global Centre for Clean Air Research, University of Surrey
GCRF:	Global Challenges Research Fund
GDPR:	General Data Protection Regulation
HedgeDATE:	Hedge Design for the Abatement of Traffic Emissions
HSY:	Helsinki Region Environmental Services
H2020:	Horizon 2020 Programme, European Commission
ICT:	Information and Communication Technologies
ICTH:	International Conference on Current and Future Trends of Information and Communication Technologies in Healthcare
IDM:	Institute for Sustainable Mobility, University of Ghent
IMDB:	Internet Movie Database
IMOB:	Transportation Research Institute, University of Hasselt
IPR:	Intellectual Property Rights
IRPUD:	Institute of Spatial Planning, Technical University Dortmund
iSCAPE:	Improving the Smart Control of Air Pollution in Europe
KPI:	Key Performance Indicator

NBS: Nature-Based Solution

NGO: Non-Governmental Organization

NOx: Nitrogen Oxide

NO2: Nitrogen Dioxide

OAL: Open Air Laboratory

OLLDs: Open Living Lab Days

OPERANDUM: Open-Air Laboratories for Nature-based Solutions to Manage Environmental Risks

O3: Ozone

PCS: Passive Control System

PM: Particulate Matter

POLIS: Cities and Regions for Sustainable Transport

TCD: Trinity College Dublin

TUDO: Technical University Dortmund

SMART: Specific, Measurable, Attainable, Relevant, and Timely

SME: Small-to-Medium Enterprise

SWOT: Strengths, Weaknesses, Opportunities, and Threats

UCD: University College Dublin

UH: University of Hasselt

UK: United Kingdom

UNIBO: University of Bologna

UoS: University of Surrey

USA: United States of America

Veg-Gap: Vegetation for Urban Green Air Quality

VITO: Flemish Institute for Technological Research

VLEVA: Liaison Agency Flanders-Europe

VMM: Flanders Environmental Agency

WDR: West German Broadcasting

WP: Work Package

1. Executive Summary

This report outlines a strategic plan for extending the life of the iSCAPE Living Labs beyond the project. The plan was developed following a three-step approach which involved the assessment of the current state of the Living Labs, development of the sustainability objectives, and planning of the actionable initiatives. The report is structured around the three core steps and addresses the following questions for each project Living Lab: Where are we now? Where do we want to be? How do we get there?

To deliver actionable content for this report, numerous activities were conducted by the project partners during the last year of the project implementation. These activities include the internal workshops, self-assessment and external evaluation of the project Living Labs, and the development of the long-term goals and individual action plans, all of which are reported in this deliverable.

In addition, this report summarizes the recommendations and guiding principles that were considered by the project Living Labs to develop their sustainability plans. Moreover, the report contains an overview of the activities that each Living Lab accomplished during the course of the project to demonstrate the commitment to their goals and long-term action plans. These activities were conducted with the aim to ensure that Living Lab components developed as a part of iSCAPE, including the Living Lab mindset, physical and virtual infrastructure, knowledge, and skills are sustained beyond the project and contribute to local urban innovation activities and ecosystems.

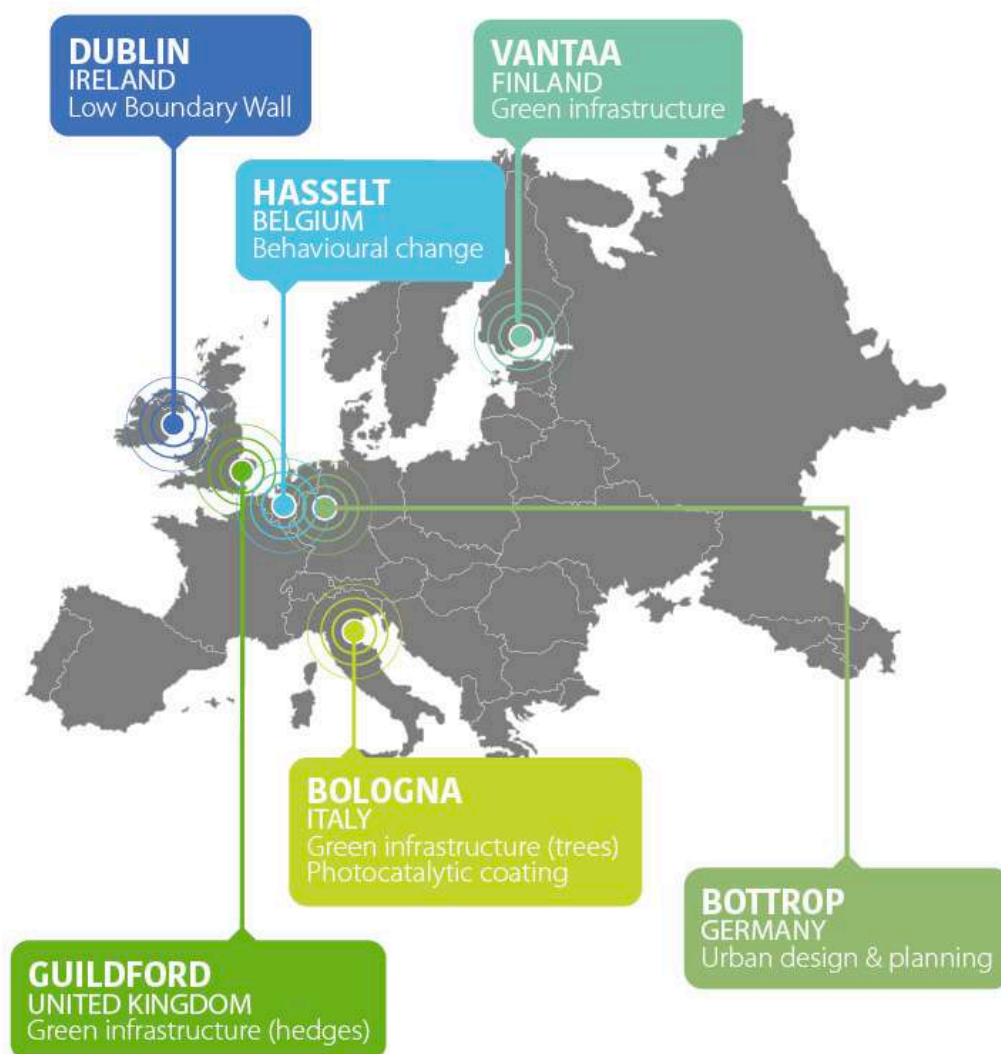
Furthermore, the report shows that all of the iSCAPE Living Labs have climbed up the learning curve, while realizing valuable lessons along the way. This experience can provide some practical insights to other Living Lab projects or similar initiatives established as part of a project with restricted national or EU funding.

The delivery of this report was led by UCD and supported by the project Living Labs along with ENOLL and FCC, all of whom contributed greatly to this report.

2. Introduction

This report provides an overview of the activities conducted to extend the life of the iSCAPE Living Labs (Figure 1). These activities were carried out as part of a larger work package (WP) dedicated to monitoring and evaluating project interventions (WP5). More specifically, they were part of Task 5.4 titled ‘Living Lab sustainability’. The core assignment of this task was to ensure that Living Lab components developed during the project including the Living Lab mindset, physical and virtual infrastructure, knowledge, and skills, are sustained beyond the iSCAPE project and contribute to local urban innovation activities and ecosystems. Task 5.4 was led by UCD and supported by the project Living Labs along with ENoLL and FCC, all of whom have contributed and provided valuable insights for this report.

Fig. 1: iSCAPE Living Labs and their interventions



Scope of the report

The purpose of this report is two-fold:

- To outline a strategic plan for extending the life of the project Living Labs. This plan was developed following a three-step approach involving the assessment of the current state of the Living Labs, development of sustainability objectives, and planning of the actionable initiatives. The report contains a dedicated chapter for each of these steps.
- To describe the main considerations that were made to develop the strategic plan and capture the experiences of the project Living Labs. These insights can be valuable for other Living Labs or similar initiatives established during a project with restricted national or EU funding.

The scope of this report is limited to the activities planned and conducted as part of Task 5.4 and does not describe how the project Living Labs were established and managed. These activities have been described in other project deliverables produced as part of WP2, dedicated to the Living Lab set-up and management. For example, local stakeholder analysis and risk assessment were provided in [Deliverable 2.1](#). The main considerations made to establish the iSCAPE Living Labs and their implementation plans were described in [Deliverable 2.2](#). [Deliverable 2.4](#) provides a stakeholder management plan and [Deliverable 2.5](#) summarizes activities conducted by the project Living Labs and gives a brief overview of stakeholder feedback. These reports are publically available on the project website¹. In addition, this report does not describe activities pertaining to the development and implementation of the Virtual Living Lab, an [online platform](#), which was developed as part of WP8 to communicate and disseminate information about Living Lab activities.

Key activities

In order to develop a sustainability plan for each of the project Living Labs and deliver actionable content for this report, numerous activities were conducted during the last year of the project implementation. These include the following:

- **Two-day working session between UCD, FCC, and ENoLL (24-25 January 2019, London, UK):** This highly interactive session was planned such that the project partners could effectively exchange with valuable information, insights, and experience relevant to the project Living Lab activities. During the course of the project, FCC was responsible for the oversight and management of the project Living Labs while ENoLL focused on dissemination and exploitation of lessons learned and knowledge that the six Living Labs have developed throughout the project. UCD's responsibilities included the leadership and coordination of the development of the Living Lab implementation and sustainability plans. These insights and experiences with the Living Labs helped to develop a clear plan for activities to be delivered.

¹: iSCAPE project website: <https://www.iscapeproject.eu/scientific-reports/>

Fig. 2: Working meeting, 24 January 2019, London (UK)



- Workshop ‘Strengths, Weaknesses, Opportunities and Threats of the iSCAPE Living Labs - goals for the future & how to get there’ (15 March 2019, Vantaa, Finland):** During the bi-annual project meeting, a dedicated workshop to collect insights and learnings from the experience of Living Labbing was organized by UCD and ENOLL. During the workshop, the project Living Labs reflected on their internal strengths and weaknesses, as well as identified external opportunities and threats. The SWOT analysis not only helped the project Living Labs to assess their current situation, but also helped to determine their sustainability strategy, which included a long-term vision and goals.

Fig. 3: Vantaa Living Lab presenting the workshop results, 15 March 2019, Vantaa (Finland)



- **External evaluation of the project Living Labs (spring, 2019):** During the period from March to May 2019, all the iSCAPE Living Labs underwent external evaluation following the process of the 13th Wave for ENoLL Adherent Membership² to ensure objectivity and impartiality in the process of the Living Lab assessment, as well as to assess the degree of maturity of the project Living Labs. This was a mock exercise and involved a review of the Living Lab applications by a committee of three external experts which were selected from the ENoLL's network of long-standing Living Lab practitioners. Completing the application required each Living Lab to describe their experience in Living Lab operations, including strength and maturity of multi-stakeholder partnerships, effectiveness of communication and media usage, availability of appropriate equipment and infrastructure, methods for user engagement, and visibility of benefits and co-created values. The mock exercise not only provided the Living Labs with a valuable learning experience about what it would take to obtain the official Living Lab label and membership status, but also helped the Living Labs to develop realistic sustainability plans.
- **Cross-evaluation and recommendations by ENoLL Living Lab experts (June, 2019):** Following the external evaluations by the three external experts, the two co-chairs of the 13th wave evaluation procedure were involved through ENoLL in creating a cross-evaluation of the six individual Living Labs to form a comprehensive summary of the iSCAPE Living Labs as a whole. In addition to the evaluation of the Living Lab aspects that were considered positive or to be improved, this cross-evaluation summarized the findings and provided further recommendations for the way forward - information which is not included in the regular evaluation of the 13th wave applications.
- **Adaptation of the external recommendations (summer 2019):** To develop a sustainability plan for each of the project's Living Labs, an iterative approach was used to incrementally improve the individual Living Lab plans by taking into account external recommendations and benchmarks. During this process, a detailed analysis of the workshop results and Living Lab self-assessment was conducted to fine-tune the Living Lab long-term goals and adapt their plans in the light of the external recommendations.
- **Actions taken by the project Living Labs (spring-summer 2019):** In addition to developing the individual long-term goals and action plans, each project Living Lab dedicated significant efforts and applied their skills and knowledge to various initiatives, demonstrating their commitment and willingness to take concrete actions to sustain their Living Lab operations beyond the project. These activities included, for example, dissemination of the Living Lab results to increase visibility and impact, citizen and local stakeholder engagement activities to build upon the momentum and enhance the established collaborations, as well as leveraging Living Lab infrastructure and equipment in addition to exploring synergies with existing projects and developing new projects to obtain funding for Living Lab activities after the completion of the iSCAPE project.

²: Adhered Member Application Guidelines by ENoLL:
<https://enoll.org/wp-content/uploads/2019/01/enoll-application-guidelines-13th-wave-1-1.pdf>

Fig. 4: Guildford Living Lab with the Merrow Residents' Association, 9 June 2019, Guildford (UK)



Report structure

This report is structured around three core questions which were addressed by project partners to develop a plan for extending the life of the Living Labs beyond iSCAPE: Where are we now? Where do we want to be? How do we get there?

Firstly, the assessment of the current state of the Living Labs (“Where are we now”) is provided. This chapter includes a description of the approach used to evaluate the project Living Labs, provides a cross-evaluation of the project Living Labs, and presents an individual SWOT analysis for each Living Lab.

Secondly, the development of sustainability goals (“Where do we want to be”) is described. This chapter includes an overview of the guiding principles which were used to develop the long-term vision and goals for the project Living Labs. The chapter builds upon the Living Lab assessment and demonstrates how the project Living Labs leverage their strengths and opportunities to sustain knowledge and skills developed throughout the project in the long run.

Furthermore, an actionable plan (“How do we get there?”) is presented. The chapter includes an individual plan for each Living Lab and provides concrete examples of what’s been accomplished by the Living Labs in terms of sustainability during the course of the project.

Finally, the report is concluded with a summary of the key takeaways and lessons learned.

3. Living Lab Assessment: Where Are We Now?

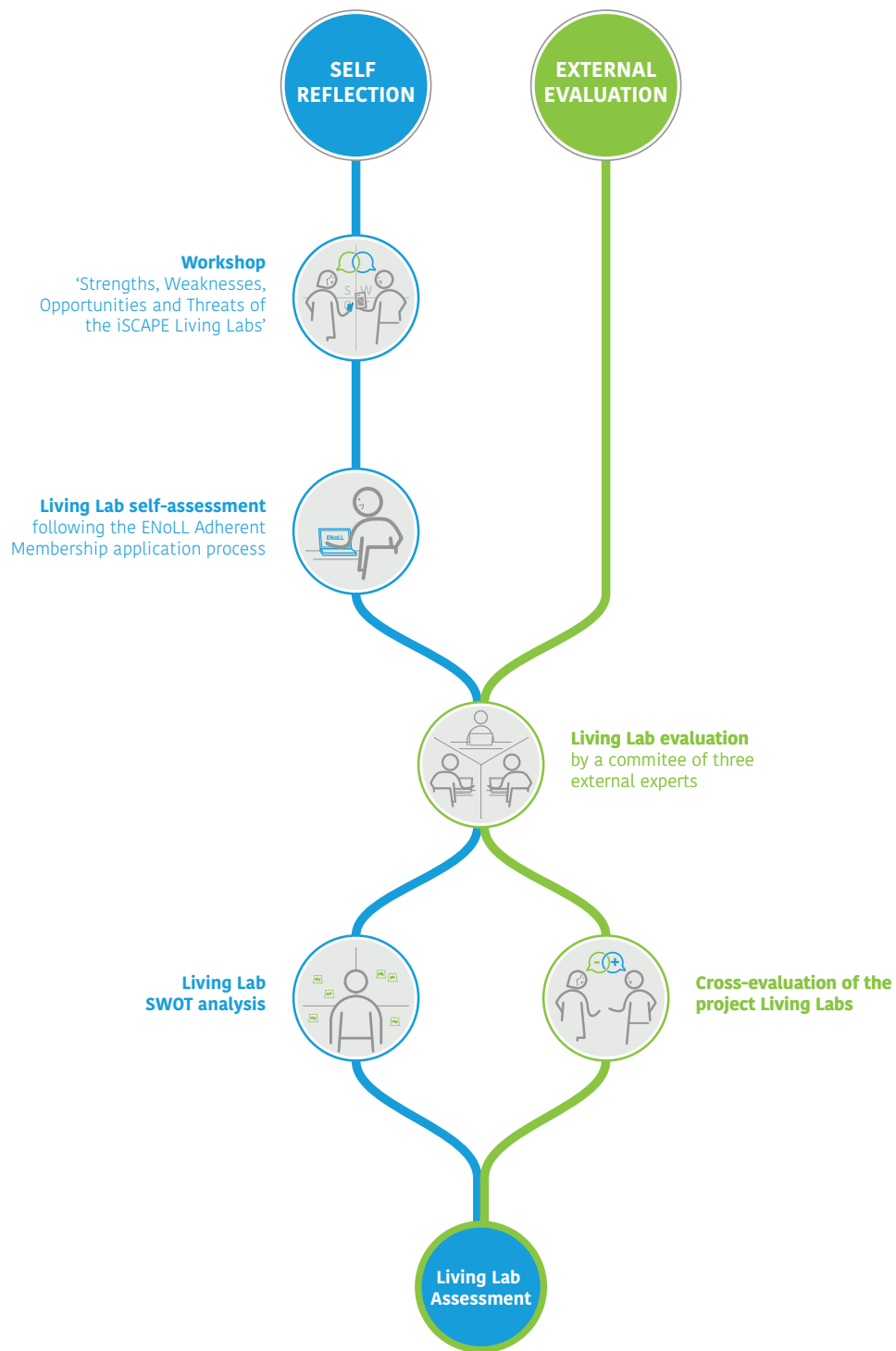
In order to plan for the future and develop a strategic plan for extending the life of the project Living Labs beyond the iSCAPE project, a common understanding of current circumstances must be reached first. Having a clear understanding of ‘Where are we now?’ is essential to developing such a plan that takes into consideration both the internal and external environment, as well as long-term priorities. Therefore, this chapter aims to provide a comprehensive overview of the current state of the project Living Labs, as well as summarize activities accomplished to assess the project Living Labs.

iSCAPE’s approach to assessing its Living Labs stands out from other approaches used by large-scale European projects because it integrates aspects of both self-reflection and external evaluation. This interactive and iterative evaluation approach was built upon the well-established assessment criteria and designed such that Living Labs are assessed both collectively and individually.

3.1. Interactive and iterative evaluation approach

The assessment of the project Living Labs was carried out following a unique evaluation process, which integrates Living Lab self-reflection and external evaluation of the current state and maturity of the Living Labs, by a committee of external experts. iSCAPE’s line of action also disrupts the traditional linear process, often used in planning, and enables a more iterative and incremental approach to assessment and strategic planning. Figure 5 provides an overview of the evaluation process, highlighting the key steps and activities.

Fig. 5: The evaluation process of the project Living Labs



Self-reflection by the project Living Labs

All the project Living Labs were engaged in a self-reflection process, which required active thinking about their previous experience in Living Labbing. These reflections focused on what Living Labs can learn from their experiences as learning from previous experience to develop a capacity to act more efficiently in the future is at the core of the self-reflection process. To facilitate self-reflection, a number of activities were organized during the last year of the project implementation.

For example, during the project General Assembly meeting in Vantaa, Finland, a dedicated workshop was organized by UCD and ENOLL (“Strengths, Weaknesses, Opportunities, and Threats of the iSCAPE Living Labs - goals for the future & how to get there’, 15 March 2019). This interactive workshop created a collective experience and enabled idea sharing not only amongst Living Lab team members, but also across the Living Labs. There were 5 groups from the workshop participants formed, each of them focusing on one Living Lab (Bottrop, Dublin, Guildford, Hasselt, and Vantaa). Because representatives of the Bologna Living Lab were not able to attend the workshop, this Living Lab ran a separate workshop following the same workshop structure after the project meeting on 29 April 2019.

Fig. 6: The SWOT analysis of Bologna Living Lab, 29 April 2019, Bologna (Italy)



The first part of the workshop was focused on analysing strengths, weaknesses, opportunities, and threats of the Living Labs. The SWOT analysis technique was used because it considers both internal and external circumstances, as well as presents information in a simple and organized list. During this session, the participants were asked to think individually first and then share their thoughts and insights with the rest of their group for further analysis. Next, the groups were asked to review and prioritize their strengths, weaknesses, opportunities, and threats. To accomplish this task, the participants were encouraged to discuss, for example, what opportunities the teams should pursue given their circumstances, what internal strengths they can enhance, and what internal threats they can minimize to achieve these opportunities.

The outcome of this part of the workshop was an initial SWOT analysis, which was digitized by UCD, ENoLL and FCC for further work and assessment of the current circumstances of the Living Labs.

Fig. 7: The SWOT analysis of Dublin Living Lab, 15 March 2019, Vantaa (Finland)



Following the workshop, each Living Lab put significant efforts in completing an application following the process of 13th Wave for ENoLL Adherent Membership³ (March - April 2019). Completing the application required each Living Lab to reflect on their experience in Living Lab operations, including strength and maturity of multi-stakeholder partnerships, effectiveness of communication and media usage, availability of appropriate equipment and infrastructure, methods for user engagement, and visibility of benefits and co-created values. These applications were submitted for external evaluation as further described below.

Having undergone the external evaluation, the Living Labs revised and further adjusted their SWOT analysis taking into consideration the results of the evaluation (May - June 2019). The final versions of the SWOT analysis are included in Section 3.3 of this report. The SWOT analysis contributed greatly to the development of realistic Living Lab goals, leveraging their internal strengths and future opportunities while minimizing weaknesses and threats.

3: Adhered Member Application Guidelines by ENoLL:
<https://enoll.org/wp-content/uploads/2019/01/enoll-application-guidelines-13th-wave-1-1.pdf>

External evaluation by ENoLL Living Lab experts

In addition to the internal self-reflection of the Living Labs themselves, the evaluation procedure also employed external evaluators - Living Lab experts - in assessing the Living Labs. During the period from April to May 2019, all the iSCAPE Living Labs underwent external evaluation following the process of the 13th Wave for ENoLL Adherent Membership⁴ to ensure objectivity and impartiality in the process of the Living Lab assessment, as well as to assess the degree of maturity of the project Living Labs. This was a mock exercise and the procedure chosen for the external evaluations followed that of the application process of ENoLL that is organised annually in 'waves'. This year - in 2019 - the 13th wave of the applications was opened, thus allowing the iSCAPE Living Labs to follow the same application process as those Living Labs that apply to become members in the ENoLL network. This process involved a review of the Living Lab applications by a committee of three external experts which were selected from the ENoLL's network of long-standing Living Lab practitioners. The process was monitored by the two chairs of the 13th wave evaluation procedure, responsible for compiling the evaluations together and final quality check.

Since the founding of the network in 2006, this annual application process has focused on evaluating potential new members wishing to enter the network in terms of their Living Lab structures and operations. The application process ensures that the true nature of Living Labs is followed and respected. In addition, potential new members must also ensure their ability to be sustainable in the present and the future as a Living Lab, and therefore, belong to the Living Lab community in the long term. The first step in entering the network is applying as an adherent member, a process which the iSCAPE Living Labs also followed.

Adherent members are Living Labs that ENoLL recognizes as representing a Living Lab, duly selected according to the application process. Adherent membership status allows the newly accepted member rights to the usage of ENoLL logo, with a personal Living Lab page on the ENoLL website. The number of applications received vary between 20-28 applications annually, with a passing percentage varying between 50-68% annually. New members accepted to the ENoLL network therefore vary between 10-19 new members, annually (data⁵ based on the past 4 years, from the 10th wave applications onwards).

Two out of six Living Labs from iSCAPE passed the threshold set by the 13th wave evaluation process: Dublin Living Lab and Bottrop Living Lab. This positions the passing percentage of iSCAPE Living Labs at 33%. Even though other project Living Labs did not pass the threshold, the obtained scores demonstrate that these Living Labs have reached a sound maturity level too. All iSCAPE Living Labs scored especially high across the following three criteria: openness, users and reality, and value (described in Section 3.2). All six Living Labs were provided with a detailed report on their evaluation results, including explanations on the scores given per each criterion.

⁴: Adhered Member Application Guidelines by ENoLL:
<https://enoll.org/wp-content/uploads/2019/01/enoll-application-guidelines-13th-wave-1-1.pdf>

⁵: Information provided by ENoLL for this report

This mock exercise not only provided the Living Labs with valuable learning experience about what it would take to obtain the official Living Lab label and membership status, but also helped the Living Labs to develop realistic sustainability plans.

In addition to the evaluation of the Living Lab aspects that were considered positive or to be improved, the cross-evaluation of the project Living Labs was conducted in June 2019. The findings and further recommendations for future improvement are summarized in the next section.

3.2. Cross-evaluation of the project Living Labs

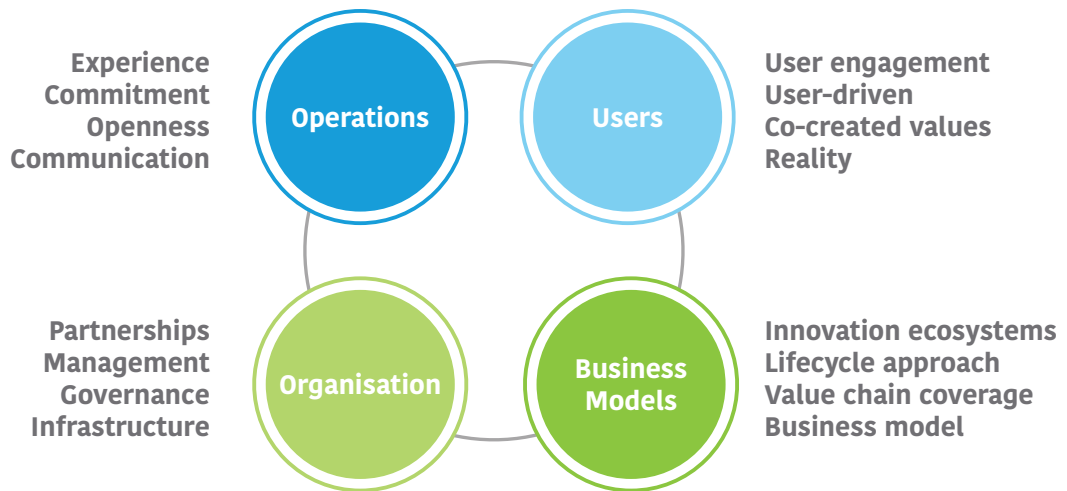
In the following section, the cross-analysis of the iSCAPE Living Labs is provided. It highlights the similarities and differences across the iSCAPE Living Labs (Section 3.2.1), as well as presents the peculiarities of the iSCAPE Living Labs (Section 3.2.2) as compared to the larger Living Lab community.

The cross-evaluation of the six Living Labs involved a comprehensive review of the Living Lab applications submitted for the external evaluation following the ENoLL Adherent Membership process, as well as the evaluation results and supporting documentation outlining the Living Lab activities. The supporting documents included Deliverable 2.5 ‘Community Feedback Reports’ available online on the project website⁶ in addition to the individual Living Lab SWOT analysis (Section 3.1). This cross-evaluation was conducted with the aim of identifying commonalities and differences between the six iSCAPE Living Labs to provide a holistic view. In addition, the six Living Lab cases from iSCAPE were reflected upon the previous experience and considerations of the ENoLL experts against other Living Lab evaluations, highlighting the similarities and differences between the iSCAPE Living Labs and other Living Labs who have applied or previously entered the network. In this way, the iSCAPE Living Labs are situated within the context of the iSCAPE project and in comparison to the Living Labs community and beyond, facilitating learning and sharing of knowledge and potentially identifying growth opportunities for the future.

The cross-evaluation is structured around four categories: Operations, Users, Organisation, and Business models which include sixteen evaluation criteria (Figure 8). This framework was created to distill the sixteen evaluation criteria used to assess Living Lab applications as part of the ENoLL Adherent Membership application process into four categories for a more holistic view of the Living Lab characteristics overall.

⁶ iSCAPE project website: <https://www.iscapeproject.eu/scientific-reports/>

Fig. 8: Cross-evaluation categories - a framework based on the ENoLL Adherent Membership criteria



Operations

The category ‘operations’ consists of the evaluation criteria ‘experience’, ‘commitment’, ‘openness’ and ‘communication’. Looking at a Living Lab from an operational perspective offers the possibility to judge not only Living Lab’s experience, maturity of projects and activities, but also their way of developing an open-minded perspective when it comes to all stakeholders from the quadruple helix (academia, industry, government, and civil society). Important aspects in this part of the evaluation are, among others, proof of Living Lab activities, stakeholder engagement and communication strategy, evidence of how the co-creation trajectory has been established, the level of effectiveness of communication and how this is handled to keep a deeply transparent approach among all the stakeholders.

Users

‘Users’ category includes the evaluation criteria of ‘user engagement’, ‘user-driven’, ‘co-created values’ and ‘reality’. Here, several elements are taken into account such as how users/citizens have been involved and engaged in the development process of new solutions, how intellectual property is managed during the co-creation process, as well as what tools and methodologies are used to engage and co-create with users/citizens. The methods and tools deployed by a Living Lab in their engagement activities are evaluated in terms of their effectiveness. Important aspects in this part of the evaluation are, among others, proof of a structured way and dedicated efforts for active user involvement, a palette of co-creational methods and tools, as well as evidence of co-created values for all types of stakeholders.

Organization

Under the ‘organization’ category, the following evaluation criteria are included: ‘partnerships’, ‘management’, ‘governance’, and ‘infrastructure’. Investigating the organizational level of a Living Lab creates insights into the foundations of the Living Lab and its strengths, focusing on the resources on the one hand and the management of the Living Lab on the other hand. Important aspects in this part of the evaluation are, among others, proof of infrastructure, equipment, and data, proof of a strong network including different types of stakeholders, as well as evidence of a clear governance model with dedicated and sufficiently supported roles and responsibilities.

Business models

The ‘business models’ category holds within it the following evaluation criteria: ‘innovation ecosystems’, ‘lifecycle approach’, ‘value chain coverage’ and ‘business model’. Creating a viable business model that offers value to all different types of new and/or involved stakeholders is key to the sustainability of a Living Lab. Critical elements to be considered are, for example, funding sources, value proposition, lean approach, impact, purpose, and key metrics. In addition, all the phases of a lifecycle approach should be considered: from ideation to design, experimentation and validation. Important aspects in this part of the evaluation are, among others, proof of integration of the Living Lab operations into innovation ecosystems, SWOT-analysis of a Living Lab, a roadmap for the future, and a value chain approach throughout the operations of a Living Lab.

3.2.1. Similarities and differences across the Living Labs

The project’s focus and approach to setting up and managing the Living Labs have influenced the structure and operational models of the Living Labs which resulted in several similarities between them. For example, the Living Labs are hosted by strong research organizations with clear expertise and experience in participating in European projects. The partners also share the challenge of limited resources (staff, time, and money) for the Living Lab activities. The Living Labs have used a systematic approach to foster awareness of air pollution effects among citizens, especially young people, and citizens, especially young people, by engaging them into activities to facilitate their behavioral change.

However, several unique characteristics constitute clear differences between the Living Labs. The biggest difference between the iSCAPE Living Labs becomes evident in terms of the previous experience with Living Labs and way of working throughout the project. There is a difference in their engagement with the local stakeholders in the innovation ecosystem in which they operate, as well as in their involvement of different types of stakeholders from the quadruple helix (academia, industry, government, and civil society). How the Living Labs have exploited their media coverage also shows some clear differences. Furthermore, the methodologies to

engage citizens and the different activities performed show some clear differences between the Living Labs, as well as the level of engagement. The activities range from awareness and dissemination events to deeper engagements where the focus lies on new ideas and innovative problem-solving.

Organization

'Organization category includes the following evaluation criteria: 'partnerships', 'management', 'governance', and 'infrastructure'.

Partnerships: All iSCAPE Living Labs are hosted by research institutions. The involvement of local universities (UH, UCD, UoS, UNIBO, TUDO) is a clear common typology between them. Vantaa Living Lab is an exception because it is hosted by a research institute, FMI, which is not a local university.

Looking at the multi-stakeholder partnerships of the six iSCAPE Living Labs it stands out that, although all of the Living Labs made efforts to include different types of stakeholders from the quadruple helix, not all of them fully succeeded in doing so. Most of the Living Labs have strong partnerships with local authorities and civil organisations, yet, the engagement of private businesses is less evident in the activities performed by the six Living Labs. Furthermore, despite the number of collaboration partners and organizations, there is still a need for setting up clear roles between the Living Lab and its stakeholders to facilitate the further development of the Living Labs. In addition, the transparency of such partnerships, the way in which they are set up and how active the different kind of stakeholder groups are involved inside the multi-stakeholder ecosystem of each individual iSCAPE Living Lab should be further clarified for future steps.

Management: For a well-structured and organised Living Lab the manager of that lab is required to run the organisation and the team involved. The assigned manager of the Living Lab is required to define the roles and responsibilities of the team members, as well as manage and maintain Living Lab operations. Currently, the teams in the iSCAPE Living Labs often consist of Ph.D. students and other research members, however, the definition of other Living Lab roles and expertise is missing. Therefore, the various roles that each of the individual members have in the Living Lab team should be further clarified.

Nevertheless, all six Living Labs have demonstrated strong research capabilities and therefore, this aspect is very well covered by all of the six cases. To further improve the structure and operations of the Living Labs clear roles for panel/ community management, as well as business development and administrative support should be assigned. Therefore, all the project Living Labs would benefit from further staffing efforts focused on hiring personnel with expertise in Living Lab activities and operations, with a clear description of their roles and dedicated resources.

As mentioned previously, the Living Labs have a lot of similarities. They differ, however, in terms of management and structure of the internal teams. Some Living Labs are founded across their strong and established organisational structures while others are organised in smaller groups, with dedicated team members and (co-) leadership from dedicated professors.

Governance: The governance structure of the six Living Labs is where most improvements are required in forming a solid basis for the Living Labs in the future. Dedicated resources such as time, staff and financial stability are crucial to ensure the long-term viability of the Living Lab. The importance of this aspect has been clearly recognized by both, the Living Labs themselves during the self-evaluation, as well as by the Living Lab experts during the external evaluation.

Limited resources and time were mentioned by all the project Living Labs in their SWOT analysis, resulting in different challenges for the Living Labs. Some aspects mentioned by Living Labs include:

- There is a limited number of staff members to be engaged in Living Lab activities and their availability is limited too (Bologna Living Lab);
- Living Lab activities demand far more resources in terms of money and staff than expected (Bottrop Living Lab);
- Team members are involved in several projects and research activities, and therefore, there is a need for additional personnel to increase the capacity of the Living Lab (Dublin Living Lab);
- Managing and delivering of events; workshops and public engagement activities take more time than the team can sometimes afford (Guildford Living Lab);
- Given the limited number of staff members and their availability, the Living Lab experiences difficulties in planning new citizen engagement activities (Hasselt Living Lab);
- Time was needed to define the Living Lab direction, processes, lines of communication and activities, which in turn means that the Living Lab is often under time pressure to deliver (Vantaa Living Lab).

From the Living Lab evaluation results, it's clear that the different levels of Living Lab experience strongly influenced the governance models since the Living Labs with the most experience seem to have the least troubles governing their operations. Previous experience with Living Lab operations also results in less time required for climbing up the learning curve in performing the activities.

Infrastructure: All the project Living Labs are well-supported by their host organizations. Therefore, it can be assumed that the Living Labs have enough working space to operate from, although this has not been specifically mentioned as a strength in their SWOT analysis. Dedicated space for interacting with different kinds of stakeholders is clearly an infrastructure that all six iSCAPE Living Labs have. Concerning infrastructure, the real-life setting is a key element of Living Labs and when dealing with the topic of air pollution, many of the activities in the Living Labs have been performed outside. Most of the Living Labs also do not explicitly mention the availability of data as one of their strengths in the SWOT analysis, although in most cases there is enough data available to consider it as one of their advantages. To mention a few, it might be assumed that FMI in Vantaa has an abundance of meteorological data while IMOB in Hasselt has large amounts of mobility data.

Nevertheless, there is room for improvement and the Living Labs could advance their infrastructure by creating a unique identity for the Living Labs, beyond the iSCAPE project. The iSCAPE project brand is currently a connecting link between the Living Labs, yet, each individual Living Lab could benefit from the opportunity to adapt to their own context and stakeholders whose needs they are addressing. Individual Living Labs should develop their own brand beyond the project, addressing specifically the stakeholders, their interests and targeting their branding to appeal to them specifically. Bottrop Living Lab has already taken the first steps in creating personalized materials for the Wandering Trees Parades. In addition, the project Living Labs should explore new tools and methodologies for analysing feedback and interacting with users. The Smart Citizen kits are a great tool for these activities, however other tools for feedback collection and citizen engagement should be assessed to facilitate co-creation activities.

Users

The 'Users' category beholds the evaluation criteria of 'user engagement', 'user-driven', 'co-created values', and 'reality'.

User engagement: Having reviewed the user engagement activities reported by the Living Labs, it can be concluded that all the project Living Labs have had satisfying interactions with users, despite the reported lack of dedicated time and/or underestimated resources needed to perform the activities. Therefore, the next step that all Living Labs should consider would be the development of a structured approach to long-term user engagement to improve user engagement and stakeholder management.

The multi-method approach, typical of Living Labs, has been evident across the six cases where the activities varied from Wandering Trees Parades (Bottrop Living Lab) to a hackathon 'Hack the Air' (Dublin Living Lab) and interactive display for greener cities (Guildford Living Lab), and the summer camp with children (Vantaa Living Lab), among others. These interaction models were especially successful in gaining deep engagement with the stakeholders beyond raising awareness.

User-driven: All six Living Labs have performed activities together with users. They also used a wide scale of co-creational methods and tools, starting with more conventional methods, like brainstorming, focus groups and interviews, and concluding with more creative solutions, like interactive quizzes, air pollution events, Lego Serious Play workshops, and hackathons. Therefore, the next step in Living Lab development would be the definition of a clear strategy for user-driven methods and tools, reinforcing the user engagement process in co-creation activities. The choice of appropriate methods and tools for engagement is an ongoing learning curve and so far, the Living Labs have done very well in the results they have reached and the activities that they have organised throughout the project.

Living Labs are often described as entities following an innovation process consisting of three phases. This process starts with exploration (the first phase of discovery, understanding the needs, challenges and opportunities), moving on to experimentation (the middle phase of prototyping and testing) and ending with the evaluation (the last phase of implementing and evaluating the solutions). The iSCAPE Living Labs should pay close attention to this innovation process, placing each of their activities along the process in order to situate where each activity is contributing: whether a workshop or a parade aims at exploring new options, or testing prototyped solutions, or maybe evaluating these? This would help the Living Labs in describing their innovation processes and the phases in which they are taking place, therefore forming the basis for a long-term approach in terms of the continuity of these activities as well as the interlinkages between them.

Co-created values: In the applications submitted to external evaluation, the co-created values were well explained by the Living Labs. However, the proof of feedback validation by different types of stakeholders was lacking. Most of the Living Labs have organized different workshops and events to foster user engagement. However, it was not clear from the applications how Living Labs have collected user feedback to establish a clear pattern for such co-creation processes in which, the interaction provides valuable inputs to the next phases in the innovation process. The clear involvement of the user's feedback in next steps is crucial in order to generate trust, ensuring that outcomes obtained from the activities and the user's feedback is creating real impact in the process.

Deliverable 2.5 'Community Feedback Reports' (available online on the project website⁷), however, provide more insights on values created for different stakeholders within their innovation ecosystem. The deliverable also demonstrates that Living Labs created an increased awareness, learned to better understand the needs and interests of their user groups and explored new ways of interacting with their stakeholders.

⁷ iSCAPE project website: <https://www.iscapeproject.eu/scientific-reports/>

Reality: Air pollution is a difficult topic to understand. Nevertheless, most of the Living Labs managed to translate this complex topic into relevant content for their targeted user groups. Using the target user's language proves to be a good approach to increase awareness about air pollution. Leaving the university context and research language, diving into the real-life context of the particular user groups has proven successful among the Living Labs. However, there are differences between the Living Labs entering these real-life contexts. From this perspective, the event-based approach of Bottrop (Wandering Trees Parades) or the children book created by Dublin Living Lab (The Air We Breath) most likely will be more effective in terms of true engagement than the approach of meetings and presentations that aim at presenting knowledge, rather than gathering insights from the participants. It is worth noting that user engagement activities should be conducted in a strategic way in the context of user daily life to create a long-term engagement.

Operations

The 'Operations' category includes the following evaluation criteria: 'experience', 'commitment & openness', 'IPR & privacy', and 'communication'.

Experience: In the applications submitted to the external evaluation, most Living Labs expressed that they did not have previous experience in Living Lab operations before the iSCAPE project, besides Bottrop Living Lab, who mentioned the involvement in some previous projects related to Living Labs, and Dublin Living Lab, who indicated a certain level of expertise based on the staff experience in the field. This lack of experience without any doubt resulted in a lack of resources to perform Living Lab activities - as many of the Living Labs indicated in their SWOT analysis - which resulted in additional resources and time spent because all Living Labs needed to learn and fail before finding the right angles to engage stakeholders and users.

All six Living Labs recognized the lack of time, money and staff as a clear weak point in their SWOT analysis, yet it is remarkable that Living Labs have managed to create such positive outcomes. To maintain this level of activities also in the future, the Living Labs should focus on developing a clear governance model (see 'Governance' for more details).

The strongest experience in Living Lab operations on a governance level is demonstrated by Bottrop Living Lab, where the hosting organisation of the Living Lab, IRPUD, has already gained a lot of experience with running Living Labs. Besides Wandering Trees, IRPUD is currently involved in managing five other Living Lab initiatives with different target groups at different spatial and administrative levels as part of other research projects.

Commitment & Openness: Regarding the general commitment towards open innovation, there are differences between all of the six iSCAPE Living Labs. They have proven to operate in an open way to an extent, yet there was not a lot of consideration or evidence of their openness towards possible new stakeholder groups given in the application submitted to external evaluation. From the applications, Dublin, Bottrop and Bologna Living Labs stood out as more open to (new) stakeholders, while other Living Labs had not considered or otherwise clearly communicated this regarding their processes. Therefore, it is recommended to all the Living Labs to focus on processes or actions to attract new stakeholders in order to improve their openness.

In addition, many of the activities that were described aimed at raising awareness, however, awareness-raising does not belong to the category of open innovation. Awareness-raising can be considered as one of the main aims of the Living Lab, among innovative co-creation actions. Nevertheless, from the analysis of the openness of the iSCAPE Living labs, it was clear that regular community engagement workshops and meetings with council groups and citizen science activities have succeeded in reaching a wide range of stakeholders and that there is a willingness to involve stakeholders in their innovation processes. However, it is worth noting that co-creation involves much more than organizing co-creation events and therefore, other types of tools and methods for stakeholder engagement should be considered.

IPR & Privacy: Evaluating the intellectual property rights and the way the Living Labs deal with this, an important distinction must be made between intellectual property rights (IPR) and data protection following the requirements of the General Data Protection Regulation (GDPR). Concerning GDPR, most of the iSCAPE Living Labs proved to have installed proper measures to protect personal data of their users. Concerning IPR, more considerations are needed to ensure that property rights are handled correctly.

Communication: There are clear differences between the six cases in terms of their approaches and levels of external communications. All six Living Labs have focused on attracting and disseminating, yet the methods range from conservative (mostly hidden in the sub-section of the host organisation's web pages) to more advanced (unique logo and communication materials). Nevertheless, most of the Living Labs managed to get a wide media coverage in the written and audiovisual press, showing that their activities can influence people's actions and decisions.

To improve, the individual communication strategy for each Living Lab should be developed taking into consideration Living Lab's goals and objectives. In addition, the Living Lab requires its own branding besides that of the host organisation, as the main target groups of academic institutions aren't the same as the target groups of a Living Lab.

Business Models

The 'Business Models' category holds within the criteria of 'innovation ecosystems', 'business model', 'lifecycle approach', and 'value chain coverage'.

Innovation Ecosystems: Analyzing the six Living Labs, the first thing which stands out is that all their host organizations are strong academic institutions with high to very high experience in participating in European projects. In addition, most of the Living Labs have established good connections with local government. Therefore, it can be assumed that a solid base for building new Living Lab projects in the future is present.

All six Living Labs are supported by a myriad of institutions with deep academic roots and local universities connected with other organisations such as city councils, or research institutes that have developed their activity in air pollution of derivatives. For instance, Hasselt Living Lab established by IMOB research institute at Hasselt University (UH) collaborates with Stad Hasselt (administrative body of the city) and other Flemish organizations such as VITO (Flemish Institute for Technological Research) and VMM (Flanders Environmental Agency). However, only Dublin Living Lab's network of collaborators includes big companies such as Google or IBM what conforms a quadruple helix fully. Nevertheless, the Living Labs have expressed their interest in expanding their networks to include private (local) businesses. For instance, Bottrop Living Lab has invested in developing their network to include local restaurants which would help them to further strengthen their local innovation ecosystem and create additional support for their future projects. In addition, the Living Labs should also consider the involvement of non-profit organizations in their activities, although Dublin Living Lab in their application mentioned several of these organizations, for example, ECO UNESCO.

Business Model: With regards to business models, most of the Living Labs rely on the sustainability of their main supporting institutions. The Living Labs have not yet designed strong and independent business models, which could give them more freedom and flexibility to grow and provide added value to its stakeholders. This is the biggest bottleneck for all six Living Labs, since all of them indicate a current lack of self-sustainability in their SWOTS.

Living Lab approach to the future varies between all the Living Labs. The following elements are mentioned as cornerstones for their business models:

- Identifying services or products to generate funding for the Living Lab (Guildford, Hasselt);
- Building up a strong citizen (science) community to deliver solutions that would benefit that community (Bologna/Guildford);
- Applying for grants and funding (Vantaa/Hasselt/Guildford/Dublin/Bottrop);
- Investing in relevant capabilities and skills of the Living Lab staff (Dublin);

- Expanding beyond the original theme of the Living Lab (Bologna/Bottrop/Dublin);
- Merging with other local Living Labs/smart city organizations (Dublin/Bottrop).

In order to reach such goals, it is recommended that all Living Labs produce a clear business plan for the future taking into account possible fallbacks, for example, not getting funding or decrease of stakeholder engagement.

Lifecycle Approach: When investigating this aspect, it was noticed that five out of six Living Labs have clearly described their lifecycle approach used in the iSCAPE project. It was also noticed that there are differences in the way each Living Lab evidences their lifecycle approach. For example, Hasselt Living Lab provides a good example of how the lifecycle approach can be taken to develop an online platform for clean routes to school by explaining how they involved the users in the ideation, experimentation and validation phase of the project. Similarly, Bottrop Living Lab clearly utilized the lifecycle approach for their Wandering Trees Parade.

Value Chain Coverage: In terms of the value chain coverage, there are elements to improve across all six cases. While Dublin Living Lab clearly covered the whole quadruple helix ecosystem, Guildford Living Lab focused on administration aspects for new policy development to foster a sustainable society. Therefore, the evaluation of the value chain coverage of the six Living Labs was difficult because only limited details are available on how the outcomes of their actions will be further used and by whom they were provided. Most Living Labs mentioned the fact that the scientific results have created value for researchers in running of upcoming projects. While Bottrop is repeating the wandering trees, as it was perceived successful, yet others e.g. Hasselt does not yet have a clear plan on how to exploit the created values of their tools in the future, nor for whom.

3.2.2. Peculiarities of the iSCAPE Living Labs

This subsection looks at the six iSCAPE Living Labs within the context of the larger Living Labs community, highlighting aspects which are similar or different to other Living Labs who have applied or entered the ENoLL network.

iSCAPE Living Labs have developed a methodology to cope with air pollution engaging different groups of people with different ages, raising awareness of the problem, as well as identifying potential solutions for tackling the challenge. However, they are experiencing the same challenges as other Living Labs. These include timely involvement of citizens, appropriate engagement of different target groups to keep their motivation, and development of strong relationships with city councils (the main driver to implement solutions for the cities), as well as press to disseminate information about activities, goals and results.

Comparing the iSCAPE's approach to setting up and managing Living Labs with the larger Living Lab community, not many other projects or programs have been created in the past following a similar approach. One example from Belgium is the Care Living Lab program. Within the framework of this program, the Flemish government funded six Living Labs to enable elderly people live longer at home. Although established under the same theme, like the iSCAPE project, they all took different angles when approaching the same problem, for example, immobility of seniors, flexibility of caregivers, or adaptation of homes to the needs of elderly people. The striking fact about the Care Living Labs is their ability to learn and adapt quickly. This was achieved by the adoption of a 'trial and error' process, where new ideas were tried out quickly in order to learn from them. This was combined with a biweekly meeting where the care Living Labs shared their learnings with each other, preventing them to make the same mistakes. The biggest difference of this approach with the iSCAPE project is the fact that all Care Living Labs were located in Flanders which made it easier to organize these face to face meetings, which were perceived with very high value by all of the six Care Living Labs. In the case of the iSCAPE Living Labs, the involvement of the universities in the process also provides a seriousness to the project and more academic insights, that improve the perception of the university support as a main knowledge center to help citizens to solve common yet challenging urban problems.

Organization

When looking at the organizational aspects of the iSCAPE Living Labs in comparison with other (emerging) Living Labs it becomes obvious that many differences but also similarities appear.

Although by far most of the emerging Living Labs start as a Living Lab project with resources provided by some kind of local or (inter)national funding program, historically less than 50% actually survives this project stage. These Living Labs achieve this by developing such governance and business models that offer them the possibility to become sustainable. Evaluating the iSCAPE Living Labs, these statistics remain in place, since two out of six (Dublin and Bottrop Living Labs) passed through the evaluation process.

Some of the differences that stand out between the iSCAPE Living Labs and the broader community of Living Labs are:

- Host organization of Living Labs - all the iSCAPE Living Labs are hosted by research institutions, although after the project some Living Labs (e.g. Bottrop Living Lab) are considering to change their host organization to the public administration of their city. Looking at the Living Labs landscape in general, Living Labs are hosted by different types of stakeholders from the quadruple helix. Besides academia, there are many Living Labs hosted by a (local) government (e.g. smart city Living Labs) or by (semi) large companies. Living labs in general are very rarely hosted by society (citizen organizations and/or non-profit organizations), although some larger NGOs have organized Living Labs before (e.g. Red Cross).

- Focus of Living Lab activities - the iSCAPE Living Labs focus on a specific topic (air pollution). Focus is important, yet often Living Labs are combining different angles within one or more thematic fields, thus, broadening their innovation ecosystem, which offers them the possibility to develop more business cases (e.g. services for SMEs in order to solve societal problems).
- Living Lab drivers - the iSCAPE Living Labs are rather research driven in comparison to more demand-driven or product-driven Living Labs which offer Living Labs as a service. Nevertheless, there are other Living Labs who are research driven providing scientific insights to (public) stakeholders. The ideal scenario is a combination of these different approaches.

Operations

In terms of operations, typically, Living Labs develop individual strategies when tackling specific challenges. However, in the context of a European project developed with some expected outcomes like iSCAPE, the individuality of a Living Lab is less important and the potential commonalities between the six cases are the key to provide added value to the final project results in order to help policymakers in their decision-making process. Therefore, in the context of a large-scale European project, it is crucial to provide a common denominator which enables the cities to implement similar activities, methodologies and specific key performance indicators. This helps to assess the impact of the solutions between different cities and/ or citizen groups, and therefore different European cultures and backgrounds. In addition, it also enables the project to produce such results that can be extended to other European cities and communities.

Furthermore, creating a clear operational structure with transparent roles and responsibilities is crucial in order to build up an organization which can address stakeholder needs and interests. This helps to set a clear understanding of what staff is needed and the skills and/or experiences they should have. At the start of nearly every Living Lab, most organizations have difficulties in defining the necessary roles and responsibilities to perform their activities such that they can meet the expectations of different types of stakeholders within their ecosystem. Therefore, this aspect is not unique to the iSCAPE Living Labs.

Looking back at the iSCAPE Living Labs, the lack of previous experience in Living Lab operations has had a great influence on the performance of their activities. In comparison, other emerging Living Labs face similar challenges, although many of them seek guidance within a mentor program or hire experienced staff members quickly. In addition, the iSCAPE Living Labs are very similar to many other Living Labs, when it comes to a unique identity of their Living Lab in which their targeted user groups can identify themselves. Typically, most Living Labs do communicate with their users and stakeholders on a regular basis, but they don't have a strong online identity (e.g long website link hidden under the brand of their host organizations). Also a logo, tagline or vision statement are very often missing, however, these elements are essential when creating a recognizable story and building an image to establish a trust relationship with their user groups.

Users

Like other emerging Living Labs, the iSCAPE Living Labs continue to discover, explore and evaluate the immense scale of co-creational methods and tools which are available for online and/or offline co-creation. Through the utilization of an array of methods and tools the Living Labs can establish a foundation, a model that involves users throughout the whole lifecycle approach and/ or the innovation funnel.

Many lessons can still be learned by the iSCAPE Living Labs in terms of user involvement, when comparing these to other Living Labs across the globe. Set aside the cultural differences between different countries and regions (that certainly have an impact on the user engagement approach that Living Labs need to take), a user engagement program must be set up in order to have a clear strategy. Setting up a clear strategy will outline the involvement of users, ensuring that the right stakeholders are involved at the right time.

Again, the real-life context is crucial, and the Living Lab activities must take place where the users are, such as in the case of the Wandering Trees Parade in Bottrop.

Business models

In relation to business models, just a few Living Labs worldwide are including business models as a priority in their design. The iSCAPE Living Labs have started the process of setting up long term viable business models for their Living Labs. Taking into account lessons learned from other Living Labs and with their own analysis of the outcomes, the six Living Labs are in a good track to reflect about the best business model to provide sustainability to their initiatives against air pollution. Sustainability is vital for the maturity model of a Living Lab and most important in order to be able to solve the challenge for the long term.

Although not every Living Lab project wants to become sustainable and although not all of the Living Labs survive till the end of their original project funding, having a business case and creating business offerings to different kinds of stakeholders are the key to becoming independent of the many funding mechanisms in the long run. Looking at the six iSCAPE Living Labs, they can learn a lot of the failures and success stories of other Living Labs. Learning from others, studying other Living Labs can be helpful in finding the right pathway for their own future and strengthening their innovation ecosystem.

3.3. Individual Living Lab SWOT analysis

This section presents the final versions of the individual Living Lab SWOTs. The assessment of the internal and external circumstances of the Living Labs was conducted in several iterations, including SWOT revisions and updates as described in Section 3.1. These SWOTs summarize the current situation of the Living Labs, describing the key strengths, weaknesses, opportunities, and threats, as well as reflect on the areas essential to Living Lab operations such as strengths of stakeholder relationships, availability of resources and skills. The information from the Living Lab SWOTs were then used to formulate long-term goals which are presented in the next chapter.

Fig. 9: Bottrop Living Lab discussing their SWOT analysis, 15 March 2019, Vantaa (Finland)





Strengths

Bologna Living Lab

Strong scientific expertise: The Living Lab team is renowned for their expertise in fluid dynamics, dispersion modelling, air pollution, urban meteorology and climatology and produces high-quality research in these areas.

Vast network of connections: These include scientific communities (e.g. National Association of Atmospheric Sciences & Meteorology), the Regional Environmental Protection Agency (ARPAE), other Living Labs (e.g. Terracini in Transizione and U-LAB, the Living Lab of the H2020 ROCK project), as well as local and international organizations and projects (e.g. the H2020 OPERANDUM project).

Strong synergies between two university departments: The Living Lab was established by the Department of Physics and Astronomy and the Department of Industrial Engineering of the University of Bologna. Such collaboration contributes greatly to the multi-disciplinary activities of the Living Lab.

Access to raw data: It is through collaboration with ARPAE that the researchers have access to valuable datasets in addition to data obtained through various field campaigns organized within the lifetime of the iSCAPE project and open data. This contributes significantly to producing high-impact scientific publications and progressing in scientific research and development.

Connection with university students: Being part of the university, the team has access to university students which are keen to participate in Living Lab activities while learning more about such topics as air quality, climate change, green infrastructure, and low-cost sensors.

Transversal skills and competencies: The team members have a unique set of skills that can be applied across disciplines and work settings. These include project management and coordination, team-work in a cross-cultural setting, problem-solving, communication, and work ethic.

Communication and visibility: The Living Lab has achieved great visibility at both national and international levels through scientific publications, dissemination events and activities on social media.



Weaknesses

Limited experience in social science: The team members are very experienced in numerical modeling and experimental studies related to urban meteorology and climatology, pollutant dispersion, and urban planning and management. However, they lack previous experience and knowledge in social science, user research, and design thinking.

Limited time and resources: Given the limited number of staff members and their availability, the Living Lab experiences difficulties in planning new citizen engagement activities. It is also challenging to find common time slots for the team members to meet.

Lack of self-sustainability: Currently, the Living Lab is dependant on the project funding to supply resources for its activities, including staff. Achieving the self-sustainability would require the team to develop such a strategy and operating procedures that can sustain Living Lab activities without external support.

Ability to translate complicated scientific research into easy-to-digest content:

The team finds it difficult to communicate and deliver results of scientific research to a non-technical audience.

Decreasing citizen engagement: The team members have observed a decline in citizen participation in specific Living Lab activities. This could be explained by the nature and specifics of the Living Lab projects, which required awareness and previous knowledge of the Living Lab's topics of interest.



Opportunities

Collaboration with external researchers: A vast network of connections opens up multiple collaboration opportunities with scientists and researchers which focus on similar research areas and H2020 projects but are external to iSCAPE.

Exploitation of scientific results: Research results produced by the team, including neighbourhood and urban scale simulations, have proven to provide valuable insights and knowledge to the Living Lab stakeholders and can be further utilized across various domains to improve well-being and quality of life for all.

Further development of the Living Lab concept: Having explored the synergies with other European projects, the team has identified opportunities to further develop the Living Lab concept by applying the knowledge and lessons learned to similar activities.

Media coverage: Dissemination of scientific results and findings via local and national press would not only increase the visibility of the Living Lab activities but would also increase public awareness of air pollution and climate change related topics.

Knowledge exchange: Being part of a larger network of the iSCAPE Living Labs enables the team to improve its operations and approach to Living Labbing by sharing knowledge with and learning from its fellow Living Labs.

Geographic location of Bologna: The location of the Living Lab is great for studying the impact of the bad air quality. This opens up opportunities for future collaborations on large-scale projects where Bologna is a pilot city.



Threats

Relevance of the Living Lab activities: To obtain funding, the team members are required to focus their efforts on producing high-quality research proposals, which are not necessarily related to such Living Lab activities as co-creation or citizen engagement.

Conflicting stakeholder interests: The Living Lab activities require a close collaboration amongst various stakeholders, which oftentimes have different interests and priorities. The team might face difficulties in finding a common ground and aligning their interests.

Limited influence on policy change: Scientific results produced by the team have a great potential to contribute to policy change, however, political decisions depend on multiple factors besides scientific findings. Because research efforts are time consuming, the team might face challenges to contribute to the urban and national policies currently being developed.



Strengths

Bottrop Living Lab

Awareness raising: The Living Lab has ran several successful awareness raising campaigns linked to initiatives (such as the city greening initiative) that have allowed connections to many stakeholders and multipliers. The regular Living Lab events and parades have provided great possibilities to network and exchange with stakeholders. Furthermore, this engagement strengthened the commitment and discussions of green issues in the city. This is projected to lead to an expansion of green infrastructure within the city of Bottrop.

Multi-stakeholder cooperation: The city, university and local businesses have all been involved in the Living Lab activities, as well as citizens, covering all quadruple helix stakeholders. Furthermore, the citizens have been involved in the process since the beginning and the variety of stakeholders provided an insight into a transdisciplinary perspective. This transdisciplinary cooperation ensures that innovative ideas and solutions for local problems are found and tested.

Direct impact and visibility: Through the close involvement of stakeholders and the “Wandering tree” parades organised, the impacts of the Living Lab have become visible quickly and directly involved the real-life setting. This has been a decisive factor in maintaining the motivation and commitment of all Living Lab stakeholders.

Collaborative management of Living Lab operations: The Living Lab team meets regularly to discuss past and upcoming activities internally, but also has regular stakeholder meetings with the quadruple helix stakeholders, with strong ties to the city representatives. Furthermore, the department which the Living Lab belongs (known as IRPUD, previously - Institut für Raumplanung Universität Dortmund) to has already gained a lot of experience in Living Labs, as it is currently involved in managing five other Living Lab projects.

Combination of funding sources: In addition to the funding from the iSCAPE project, Bottrop Living Lab has already demonstrated the ability to secure funding from multiple sources. National fundings have partially financed the Wandering trees in 2018 and 2019.



Weaknesses

Low participation and drop-outs: In some instances, the Living Lab has already experienced low participation numbers and difficulty in maintaining interest and motivation over a longer period when results and successes of the Living Lab activities were not visible directly.

Financial and human resources: The long-term sustainability of the Living Lab is not yet secured due to lack of resources. Conducting the Living Lab activities has proven to demand far more resources than expected, both in terms of financial but especially, in terms of human resources.



Opportunities

New network and initiatives: Bottrop Living Lab has built up a new network that enables it to continue activities beyond the original initiative and covering also other topics. IRPUD has established partnerships world-wide and has been engaged in a large number of projects (40 third-party funded projects, including 25 EU-funded projects). Furthermore, the department has developed strong local and regional partnerships, especially with municipalities and other administrations.

Merging of Living Labs: IRPUD manages several Living Lab projects in Bottrop, which could be connected, as another Living Lab currently exists that involves green infrastructure, climate change, and environmental pollution topics. In addition to this, there is a potential of new initiatives with the key project stakeholders taking into consideration the different motivations for participation.

Plans for future Living Lab activities: The new Wandering trees parade has started in May and will continue until autumn 2019.



Threats

Changes in host organisation: The business model of the Living Lab involves a change of hosting organisation to the partners in the city administration of Bottrop. This is necessary in order to secure the financial support of the Living Lab in the long term, however, such a significant structural change provides a potential threat in accordance to how successfully the change of host organisation is realized.

Change of management team: In addition to the changes posed by the transfer to another host organisation, the opportunity of connecting with the other Living Labs in the city also poses some changes. Switching the main management team and connecting the two Living Labs together requires changes and good communication within the management team.

Lack of funding for voluntary tasks: A self-sustaining structure is needed through the volunteering of citizens and their additional 'manpower' to assist the activities free of charge.



Strengths

Dublin Living Lab

Living Lab mindset: The team has embraced the Living Lab mindset and is committed to the key principles of Living Labbing, which include human-centered design, co-creation, and real-life testing. The previous experience in Living Labbing of one of the team members has facilitated the development of this mindset.

Large network of local collaborators: It is through collaboration on various Living Lab initiatives and personal connections of the Living Lab lead that the Living Lab has developed a large collaborator network, which opens up multiple opportunities for new initiatives and deployments.

Strong connections with the key stakeholders: These include Dublin City Council, Environmental Protection Agency, Smart Dublin initiative, as well as multiple non-profit organizations, including ECO UNESCO and An Taisce in addition to several local communities (e.g. Ringsend) and public schools.

Ability and willingness to learn: The Living Lab is constantly learning and adapting its methods, tools and approach to co-creation and experimentation. This enables Living Lab to respond to changing circumstances and stakeholder interests swiftly.

Access to various data sources and equipment: Such support is provided by the key stakeholders and is essential to producing high-quality research.

Internship opportunities: During iSCAPE, a great number of interns from various countries (e.g. France, Italy, USA, Turkey) has joined the team in delivering Living Lab initiatives.

Increasing visibility: The activities conducted by the Living Lab so far, especially Play and Learn workshop series for school children have achieved great visibility both locally and nationally.



Weaknesses

Limited resources: These include financial and human resources. Currently, the Living Lab activities are sponsored by iSCAPE and new funding sources are yet to be determined.

Overlapping priorities: The team members are involved in several projects and research activities. As a result, there is a need for additional human resources to increase the capacity of the Living Lab.

Weak operating model: To sustain the Living Lab operations, the current approach to delivering value to the Living Lab stakeholders and running its daily operations should be redesigned to align it better with the Living Lab's vision beyond iSCAPE.

Lack of specific skills: There is a limited number of staff members with expertise in user research and facilitation skills. Only a few members have some previous experience in delivering and facilitating co-creation workshops and citizen engagement activities.



Opportunities

Lack of a community of activists and volunteers: The Living Lab is yet to develop its own community of citizens who would be eager to participate in Living Lab projects and research actively. The diversity of participants should be also increased. Currently, the Living Lab is mostly engaging school children and students.

Low attractiveness of the pilot project: The pilot project of the Living Lab was designed around one of the PCS - a low boundary wall. Such intervention was perceived as 'boring and grey' by participants engaged in the Living Lab activities.

Being part of a bigger picture: It is through established working relationships and close connection with the key local stakeholders, especially Smart Dublin and Smart Docklands initiatives, that the team has opportunities to incorporate its Living Lab activities into a larger innovation ecosystem.

New large-scale initiatives and projects: The Living Lab has numerous opportunities to collaborate and develop new synergies with other European projects and networking organizations (e.g. via H2020 projects where UCD is involved), Dublin-based international companies (e.g. IBM, Google, Intel), as well as other local and international organizations due to its large collaborator network. Dublin Living Lab is "Small enough to trial, big enough to replicate".

Further development of research infrastructure: Leveraging its network, the team could apply for additional financial support to further develop its infrastructure and obtain research equipment. This includes support from the university (e.g. equipment), as well as Dublin City Council (e.g. infrastructure and social/ community centers).

Creating new services for local stakeholders: Given the team's experience in developing multidisciplinary projects which requires co-creation, involving various stakeholders, including citizens, the Living Lab could develop a service-focused business plan for human-centered innovation, experimentation, and validation.

Obtaining an official Living Lab status: With a greater degree of maturity, the Living Lab could become an official ENOLL member. Such recognition and enforcement from the Living Lab community would enable the Living Lab to position itself as an industry expert.

Increasing interest in citizen science and citizen engagement: This provides the team with new opportunities to develop projects and engage citizens in co-creation or citizen science as part of national programmes such as provided by Irish EPA.



Threats

Losing knowledge and expertise: The team members have temporary employment agreements with the university. Following the university procedures and Irish law, such fixed-term contracts can be extended up to a certain duration, which may result in losing knowledge and expertise in Living Labbing.

Lack of a strong vision for sustainable mobility: Considering Living Lab's opportunities in collaboration with the Smart Dublin programme, it is challenging to develop successful proposals for smart city initiatives such as smart transport and mobility, because there is no strong vision for sustainable mobility at the national level.

Increasing competition: Other research groups with similar interest areas could embrace the Living Lab approach, thus decreasing the team's abilities and success in securing project funding.



Strengths

Guildford Living Lab

Multi-disciplinary team: The team consists of members from different professional backgrounds, each brings their expertise and a unique skill set to the Living Lab. This cross-disciplinary skill set heightens the creativity and problem-solving potential within the Living Lab.

Strong personality of the Living Lab lead: The Guildford Living Lab is led by Professor Prashant Kumar at the University of Surrey, who established strong relationships within the air pollution mitigation scene as well as EU/ H2020 projects. He is a door opener for the Living Lab and driving force for new projects.

Clear focus: The Living Lab is based within an existing hub, Global Centre for Clean Air Research (GCARE), this allows the Guildford team to work on projects that have a clear focus. This means that lessons learned, research findings, citizen and city stakeholder relationships can be nurtured together with the number of growing projects. The GCARE is equipped with the instruments and resources essential for the Living Lab work.

Established local relationships: The Living Lab is working very closely with the Guildford Borough Council (GBC), which has provided support to the team from the start. Over the past three years, the Living Lab has also developed important relationships with, for example, the city of Guildford, Burham Community and Guildford vision group. Through citizen science and other co-creation activities, the Guildford Living Lab has established a network of motivated local citizens.

Bridging academia, citizens and local authorities: The Living Lab is following an open and human-centred approach that removes barriers between researchers, community members and policy-makers.

Openness to collaboration: The Living Lab welcomes feedback and opinions from city stakeholders and citizens, the team is very aware of local air quality issues and tries to collaboratively address the issues with people who are most affected and concerned about air pollution.

Communication across a variety of channels: Guildford Living Lab shares project updates and research findings via their newsletter, social media and scientific conferences. The Living Lab also shares its work and research findings on larger platforms such as iSCAPE, University of Surrey (UoS) internal and UoS external. This has increased not only their regional but also international visibility.

Impact on policy-making: In the last years, Guildford Living Lab has actively collaborated with GBC to implement and influence current policies around green infrastructure. Most recently their research underpinned the green infrastructure guidance document published by the Mayor's Office, City Hall in London.

Demonstration of real-life solutions: The Living Lab positioned the air quality sensors in a real-life environment, the research findings can be used as baseline data and potentially show improvements after the change of policy / green infrastructure implementation.



Weaknesses

Time and resources: The Guildford Living Lab is made up of a small core team, the majority has other responsibilities besides the Living Lab activities. Managing and delivering of events, workshops and public engagement activities take more time than the team can sometimes afford.

Skill limitations: The multidisciplinary team covers many areas that are relevant to air pollution mitigation activities, however, the team lacks expertise in social science.

One-way mindset: For scientists, it's very difficult to change their usual working pattern, including how to conduct research, who to involve in a project and how to communicate findings. All these stages are approached very differently with a Living Lab mindset. Besides, there is always the danger that research has priority to Living Labbing.



Opportunities

Influencing policy-making: The Living Lab has been already actively collaborating with GBC, local community (e.g., Merrow and Burpham Resident's Association) and with the right evidence and framework in place, the team aims to influence policy locally and nationally. Currently, the Living Lab is monitoring activities which could underpin information on passive solutions to reduce local pollution in the long-run.

Self-sustainability of the Living Lab: Guildford Living Lab is working towards such an operating model that ensures self-sustainability of the Living Lab. This requires identifying a service or developing a product that generates funding for the Living Lab.

Internal funding for a complementary project: Besides the available H2020 and British Council funding, the UoS was able to confirm some internal funding: HedgeDATE - Hedge Design for the Abatement of Traffic Emissions, which can be leveraged to continue Living Lab's activities.

New research and collaboration opportunities: The Guildford Living Lab has set up meetings with relevant stakeholders and is in the process of developing further project opportunities and research collaboration with the council and other local stakeholders, including local communities and businesses.

Practical application of theoretical knowledge: There is an opportunity of creating a real-life demonstrator that monitors concrete measurements and indicates long-term changes.



Threats

Limited external funding opportunities: The Guildford Living Lab may find it challenging to obtain sufficient funding to sustain the Living Lab activities beyond the project.

Pressure to publish papers: Within academia, the pressure to publish papers to get funding is very high and is often a priority for the teams. While further funding could provide opportunities to maintain the Living Lab activities, the new research should include Living Lab component which sometimes is challenging to include in core engineering projects. This may affect the quality and sustainability of the Living Lab work.

Lack of stakeholder commitment: Due to the lengthy project duration and exhausted motivation, the Living Lab relationships with its stakeholders may slowly quiet down owing to lack of similar post-iSCAPE activities (unless further funding is procured to sustain its activities).



Strengths

Hasselt Living Lab

Key focus on travel behavior: The strong focus on travel behavior is connected to the institute's strategic direction and research in general. In fact Hasselt Living Lab is working under the umbrella of an established institute (IMOB) with over 15 years of experience in transport planning and traffic safety. The Transportation Research Institute (IMOB) at Hasselt University is one of the largest transportation institutes of its kind in Belgium and is therefore strongly embedded in several national and international research networks.

Strategic direction within the host organisation: In line with the mission of Hasselt University IMOB has two goals: 1) research, 2) development of products resulting from the research. Therefore, the institute has a strong ability in software & app development, with the expertise available 'in-house'. Therefore, the Living Lab has access to ICT/technology knowledge & skills, as well as software & app creation skills.

Interdisciplinary research base: IMOB consists of highly trained and skilled staff that also includes interdisciplinary/intradisciplinary research. For example, the group includes psychologists, mobility and traffic safety experts in addition to programmers, web and application developers.

Experience & collaboration in national/international projects: IMOB has worked together with other organizations on multiple national/international projects to address problems related to traffic safety and mobility, and is well connected to relevant organisations in the field.

Strong communication channels: The city has good communication channels that greatly benefit communicating the Living Lab and its activities.



Weaknesses

Expertise in citizen and public engagement: Hasselt Living Lab did not have substantial previous expertise on citizen and public engagement strategies, methods and tools, especially in the domain of air quality and climate change. Knowledge and skills in facilitating engagement had thus to be built 'from the ground up'.

Language barriers: The staff members working in Hasselt Living Lab are mostly non-Belgian and the project is also in English, creating a language barrier in a Flemish-speaking city. The Living Lab minisite could include more information if it were better connected to the Flemish sources. Most of the information is produced in English.

Expertise in Living Labs: The team is new on the Living Lab ideology, with lack of experience on Living Labs.

Small pool of local stakeholders: The city of Hasselt is small, resulting in relationships with only a few stakeholders.



Opportunities

Scaling up: There is an opportunity in looking beyond Hasselt. For example, a 'route2school' app has already been adopted by other cities, too - there is an opportunity to change scale to regional and national level as well. Furthermore, there are other Living Labs operating in Belgium that Hasselt Living Lab could connect with.

Broadening the stakeholder engagement: Within the horizon of Hasselt Living Lab, there are possibilities to onboard more stakeholders. The Living Lab needs to be able to better explain to higher-ups how Living Labs work and why they are important. This could be connected to other projects doing something similar, replicating elements of the iSCAPE Hasselt Living Lab.

Engagement of policy makers: In a small city like Hasselt, it may be easier to reach higher up levels in the city and policy. There is already a long-term political interest and people are very concerned about the air pollution issue in the city. Some stakeholders have already approached the Living Lab (for example, the Flanders environmental agency) as they are interested in the element of engaging with citizens that the Living Lab has undertaken.

Future developments and investments: Living Lab activities focusing on children and other vulnerable groups of the society are of a prime interest, including, children safety while travelling to school, healthy and active commuting and travel coaching of disabled persons. The activities mainly raise the awareness and significance of the pressing issues for sustainable society, so that each group can take up further and potentially influence future political agendas. Furthermore, IMOB is planning to further invest in strengthening its relationships with international professional and research networks in the upcoming years.



Threats

Long-term organisational support of the Living Lab: Currently, the Living Lab is dependent on funding, which is a threat to the sustainability of the Living Lab in Hasselt. In addition to the shortage of funds, there is a risk in terms of the long-term employability of experiences Living Lab oriented staff.

Resources: There is a lack of resources available for the Living Lab. Given the limited number of staff members and their availability, the Living Lab experiences difficulties in planning new citizen engagement activities.



Strengths

Vantaa Living Lab

Reputation of host organisation: FMI is the 2nd most trusted brand in Finland and has an excellent reputation abroad. By association this gives the Living Lab significant credibility, as well as access to large numbers of partnerships (nationally and internationally), citizens and businesses, online and via social media.

Host organisation is a major future collaborator: FMI is viewed by the Living Lab as its biggest potential future collaborator (but not funder) with access to in-house experts from an array of disciplines. FMI also has a proven record of effective knowledge transfer and capacity building.

Previous exposure to Living Lab practices and principles: The Living Lab staff have been exposed to Living Lab practices for some time as part of their work for FMI e.g. FMI made their extensive libraries of data open for many years (FMI ranks #5 on the Global Open Data Index). Many pre-Living Lab FMI projects have followed iterative and inclusive research approaches with stakeholders and citizens.

Increasing interest from partners: The Living Lab team has developed and established new (e.g. the Heureka Science Centre and the summer school) or better (the Municipality of Vantaa) relationships through engaging dissemination, highlighting of services and expertise.

Engaging with new groups of citizens: The Living Lab has been able to disseminate to, and involve new groups of citizens (young people and older people) through co-creation in its research. In so doing, it has been able to broaden future lines of research and activate individuals.



Weaknesses

Living Lab set-up teething problems: The Living Lab initially experienced difficulty in understanding the purpose of Living Labs, and specifically the objectives of the Vantaa Living Lab. Time was needed to define the Living Lab direction, processes, lines of communication and activities, which in turn meant that Living Lab was often under time pressure to deliver.

Municipality provided no initial direction: The Living Lab had only high-level contacts with the Municipality of Vantaa at the beginning of the iSCAPE project. Effort has been expended in finding the right people at the operating level (e.g., city planners) to build the relationship.

Limited success in getting active stakeholder engagement: The Living Lab has experienced difficulty in 'engaging' stakeholders in workshops and activities. Both public and private stakeholders seem to limit their involvement in these activities even if they see the benefit of the activities themselves.

Lack of specific skills: There are a limited number of individuals with experience of user research and facilitation. However, the Living Lab has been gaining stakeholder engagement skills and co-creation skills through practice while doing during iSCAPE.



Opportunities

Build interest, affect planning and change behaviour: The results obtained in Vantaa can be used and exploited widely through dissemination opportunities for many different groups and organisations. This dissemination will build interest around the topics of air pollution and air quality, and may activate behavioural change. The results could be used by municipalities to better inform urban planning.

Results could have international applications: The Living Lab results could be used for FMI capacity building projects in developing countries.

New areas for modelling opened: Through interactions with the municipality it became clear that green infrastructure modelling could be complemented by the Living Lab also conducting health related modelling.

Seek out new opportunities: Given the work done so far, the Living Lab will seek out new funding opportunities and business models that incorporate the Living Lab concept.

Further collaboration with the municipality: The municipality has realised the potential benefits of the modelling capacity of the Living Lab and this opens the door to more municipality related projects, which in turn could be adopted at the Helsinki city level.

Further collaboration with other Living Labs: Having established themselves as a Living Lab in their own right, co-operation and knowledge sharing with other Living Labs in the Helsinki area becomes a natural next step in refining and publicising the Living Lab approach.



Threats

New business models needed for Living Lab sustainability: The Living Lab can only run as part of a 3rd party funded project (but may involve the use of experts or infrastructure but no funding from FMI). Furthermore, the municipality does not currently have funding to commission work from the Living Lab, and so any future applications for funding may need to include the local municipality as a funded partner. Given the above, new business models that involve Living Labs will need to be found over and above the traditional funding sources. New business models are also needed within climate services in general, meaning that Living Lab sustainability within climate services will be extremely challenging in the immediate future.

Conflicting stakeholder interests: Living Lab activities require close collaboration between stakeholders who may have differing interests and priorities. The team may experience difficulty in finding common ground.

Living Lab competition: The Living Lab is not the only Living Lab in the city of Helsinki. Other Living Labs have been established for many years and are likely to have greater name recognition, a broader range of partnerships and citizen relationships. Multiple Living Labs is likely to mean significant competition for funding.

4. Strategic Goals: Where Do We Want To Be?

To map out the necessary steps and develop such an action plan that considers individual characteristics of each Living Lab while focusing on their core components, the project Living Labs were asked to leap into the future and define ‘where they want to be’ after 3-5 years. The Living Labs were encouraged to identify performance gaps and develop a set of long-term goals taking into account their core strengths, weaknesses, opportunities, and threats (presented in Section 3.3). These long-term goals not only provided general direction and clarity for Living Lab sustainability but also helped to focus and prioritize activities aimed at achieving these goals.

Similarly to the Living Lab evaluation, the development of long-term goals was carried out in several iterations. First, the Living Labs were asked to discuss where they want to be in a few years from now and how they can sustain their knowledge and skills in Living Labs during the workshop in Vantaa, Finland (15 March 2019). Next, the Living Labs reflected on their long-term direction when preparing the applications for external evaluation (described in Section 3.1). Following the external evaluation, the long-term goals were revised and updated, considering the recommendations and suggestions of the experts from the ENOLL network. To provide a broad overview, this chapter presents the key considerations made by the project Living Labs in a form of guiding principles in addition to the individual goals of each Living Lab.

4.1. Guiding principles for Living Lab sustainability

Having conducted a comprehensive self-reflection, individual external evaluations, and thorough cross-analysis of the six iSCAPE Living Labs, many lessons can be learned in terms of what has gone well and what could be improved upon. These results have been summarized into a set of guiding principles and written in a fun and memorable format for iSCAPE Living Labs to consider in order to achieve long-term sustainability. In addition, these guiding principles offer the Living Labs’ community some important lessons that have emerged from the project. These lessons may be applicable in their own Living Lab cases as well, thus providing a set of guidelines that can be considered beyond the iSCAPE project.

● — It’s not just a band, it’s a business

Having fun and engaging activities is a very important aspect which should be implemented into a Living Lab organization. However, having a valid business case that appeals to possible partners and stakeholders is even more important in the process to become sustainable in the long run.

Get the band together: In creating a valid business case, making sure all band members complement each other is vital to ensuring all parts of the quadruple helix are equally involved. Let's be honest, what's a band with just three drummers, except for very loud. In addition, the synergy between all band members improves upon the value for each of the members.

Write an album: Creating a viable business case involves identifying and utilizing valid business offerings which a Living Lab can offer to the different partners and stakeholders. Therefore, look at it as a creative process in which you go through a lot of lousy demos before ending up with an album full of different song styles that expand your fanbase.

● Write the Living Lab scenario

A Living Lab without an operational structure and planning is like a movie with a bad director and no plot. Bad films usually don't get into IMDB's top 250, nor will the Living Lab succeed without clear governance and action plans.

Get your crew together: Defining roles and responsibilities from the beginning plays a crucial part in becoming successful. Imagine a film crew in which the director is catering to the actors, while the writer holds the camera. Hiring the right people for the right job can only be done by creating clear roles (e.g. general management, user involvement, research, business development). Within the Living Lab organization, designing each role with transparent responsibilities and clear expectations is vital.

Write your script: Equally important as setting up the crew is planning the operations of your Living Lab. Successful planning involves developing a clear action plan and overview of the planned activities to all relevant stakeholders.

● Dr. Jekyll & Mr. Hyde

A clear identity for the Living Lab with a tailored communication strategy towards the different kind of stakeholders helps to build a trusting relationship with each of the stakeholder groups. This trust-based relationship is essential in order to maintain their engagement. In addition, the project must ensure that there is clear communication between the host organization and the actual Living Lab. For example, the tone of voice of a university will be different as the one you want to apply for your Living Lab.

Captain Spock: Giving your Living Lab a single point of contact is a smart way in lowering barriers between your organization and the targeted stakeholders. Usually, the panel manager (user involver/ community manager) picks up this role and they are the 'face' of your organization towards all users. The designated point of contact communicates with stakeholders, supports them as the first line of communication, and functions as a beacon of trust towards them.

Coming soon in a theatre near you: Building up a trust-filled relationship with users begins with speaking their language. Therefore, developing branding materials with an adapted message focused on the project's stakeholders is essential. To succeed in this, split up the communication strategy between the regular flow of the host organization and an additional one for the Living Lab. Typically, the host organization (academia, public administration, private business) has a much wider and different audience as the Living Lab.

● — Show me the money

Before a Living Lab may proceed, a successful business plan must be created. This plan should include clear cost structure and budget which both stem from the defined business case. The business plan is also useful at the end of the project, as the Living Lab may use it to evaluate its budgetary successes and shortcomings.

Money, money, money: No matter the innovative activities, methods, or tools the Living Lab is aiming to develop or use, it all comes down to this question: does the budget cover the expenses? Even though an activity may appear to be a success regarding user engagement or research, can it truly be considered a success if the actual cost of the activity is double the proposed budget?

Money for nothing: Whenever you promise rewards to your users or favorable business value to the stakeholders of your Living Lab, always make sure you can deliver on those promises. Aim smaller in the beginning, and look for sponsors (partners) to alleviate some of the direct or indirect costs involved in your operations.

● — Be like Einstein solving problems

Scoping the Living Lab project and all of its activities is crucial. Einstein once said this: "If I have to solve a problem in an hour, I would spend 55 minutes defining it and 5 minutes solving it."

99 problems: Before the start of their activities, a Living Lab should clearly identify the problem they are trying to solve within a particular project, project phase, or activity. A task or activity may appear to have collected valuable results, but in review, the Living Lab may have behaved without focus on the scope. Therefore, scoping each activity and defining SMART goals presents opportunities to evaluate the actions taken and prevents precious money and time to be wasted.

Basket case: During the lead time of a project, a myriad of feedback is collected from the involved stakeholders. Among this commentary, there's always feedback which is irrelevant to the particular project or activity, but valid for follow up steps or new projects. Creating a 'golden wastebasket' is a way of dealing with this. A golden wastebasket is a (virtual) place where all this feedback is collected. It can be closed to the stakeholders for internal use only or open to them, offering stakeholders the opportunity to crowdsource their biggest needs or wants.

● Plan your Living Lab in advance

Step 1: a business case, step 2: a scoped business and project plan, step 3: an operational plan from an organizational perspective (internal) as well as from user/stakeholder engagement perspective (external). A successful operational plan is based on the previous steps, thus ensuring that follow up is easier for everyone involved.

I've got a plan so cunning you could put a tail on it and call it a weasel: Organizing all activities in a structured way enhances the next activity by improving upon previous experiences. Clarifying the “Five W’s” for each activity helps the Living Lab succeed in defining:

- who needs to be involved,
- what's expected from them,
- where will the activity be organised,
- when will it start, when will it finish,
- why is it organized.

● Love your people like yourself

Without stakeholder and/or user engagement, a Living Lab cannot exist. Communicating with passion about the purposes of the Living Lab and all of its activities is the beginning of this journey. User engagement should always be about encouraging people to share their valuable insights about their problems and potential solutions in their daily life. Providing various routes of communication to people so that their feedback can be received in their own way is also important.

Can't buy my love: Research and experience from other Living Lab organizations have found that users participate for the intrinsic value they either find or can offer in relation to the scoped problem, rather than the money they could get. Therefore, it's crucial to make sure the outcomes of the activities and projects are shared with the people creating them.

I love you just the way you are: Users tend to participate in projects when they can be themselves. Projects may also have more success if the space is provided to allow and encourage users to act as they would do in their daily life. The Living Lab should offer users the possibility to do so, and never force users to perform things which they don't want to. Therefore, listening to their contexts is essential.

● Stay green

Always starting from scratch when organizing Living Lab activities and being conscience of the scoped problem definition prevents the Living Lab from repeating mistakes. Naturally, lessons learned need to be captured and carried forward, but in reusing them, they should be adapted to the next context.

Forever young: The Living Lab should not rely on previous ways to organize their activities. By approaching from the viewpoint of an outsider, one not familiar with the problem or the project, innovative ways of approaching things will arise and prevent all activities from being a copy of previous ones.

Another one bites the dust: By avoiding “idea killers” (e.g. we don’t have time, there’s no budget, the management won’t agree, it might work in other places but not here...), the Living Lab keeps a fresh and green approach to their operations. Even more powerful is replacing the “idea killers” by “idea boosters” (e.g. maybe now is the right time, let’s look at the financials later, what’s the worst thing that could happen, how do they do this elsewhere...) to encourage the progress of the Living Lab.

● — **Knowing is growing**

Each Living Lab has to define KPI’s and develop tools for monitoring their activities to be able to evaluate the success of their projects. This provides insight to become sustainable in the future by understanding the failures and success factors of each Living Lab action.

Knowing me, knowing you: Developing tools and KPI’s to monitor Living Lab activities should take a two sided angle:

1. Expectation angle - What are the goals we’re aiming for and how can we follow up on the expectations of the people involved (users/stakeholders/staff)?
2. Project management angle - How can we deliver project outcomes such that they meet the project schedule, budget and quality requirements?

Through the use of KPI’s and insights about various Living Lab aspects help to nurture successful tactics and avoid pitfalls and mismatched expectations before becoming a problem.

● — **Sowing the seeds to last**

After initial reflection into what constitutes a successful Living Lab, Living Lab managers should invest in opening up their approach to other new stakeholders and partners. By focusing on clear communication about their Living Lab, a team can create an easy-to-be-found identity, both online and offline to acquire a renewable stream of people wanting to cooperate with the Living Lab. In doing so, the lab can create an innovation ecosystem which allows them to expand their activities and projects through clear business offerings (values) for stakeholders and openness towards new partnerships.

She hates me: During the lead time of Living Lab projects, people may leave the project. Rather than focus on the successes, Living Labs can gather valuable feedback from the participants that left. In understanding the more negative view from these people, the Living Lab can adjust accordingly to reduce the number of participants dropping out.

Come together: The Living Lab also benefits from creating possibilities for users to bring friends, family, and acquaintances to participate in Living Lab activities. However, by doing so, the Living Lab should remember to profile all of its participants in order to accurately compare them afterwards.

● — **Quadruple Helix Babel Tower**

In the Living Lab ecosystems, there are a lot of entities that want to participate, need to participate, or are requested to participate. These entities ‘speak’ different languages. They also have different organizational cultures and operational approaches. Therefore, it is vital that the Living Lab brings together its stakeholders towards achieving a common vision by developing shared values and building trust.

Orchestrator multi-purpose: When several languages and dimensions are contemplated, a full time broker is required to orchestrate the connections among all the partners of the innovation ecosystem, and the profile of this position cannot be academic. The broker should be a business-minded person with the capability of “speaking” several languages: academic for the connection with universities and research centers, business for the best involvement of companies, government to understand the bureaucratic limitations and procedures, and societal to understand the real needs of the citizens that desire a better quality of life in their cities.

Pirate code: Any new partners should be able to inspire a relationship of trust between themselves and the Living Lab stakeholders. It is required from all the entities of the partnership to fully commit (with resources and budget) in order to guarantee the Living Lab successful and sustainable.

● — **Look for another part-time hobby**

Setting up and starting a Living Lab with unguaranteed levels of success, requires full-time dedication of a team (or several depending on the dimensions of the Living Lab).

Build the best A-Team: It is crucial to identify the best A-Team to run the Living Lab. A Living Lab should strive to assemble a multidisciplinary team with a highly skilled profile, full-time dedication, and motivation to run in a Death Valley with several risks and threats.

● — **The day after tomorrow**

Sustainability of a Living Lab does not imply simply receiving money from the European Union, and once the funding is over, the Living Labs cease.

Be ready for a Zombie world: When designing a Living Lab, it is vital to have sufficient financial resources that can be accessible for continuing the project once all external funding is complete. Otherwise, the Living Lab will no longer be able to carry out its mission.

4.2. Individual Living Lab goals

Goal setting was an important part of the planning process, which required each Living Lab to decide what they wanted to accomplish in terms of Living Lab sustainability beyond the project (3-5 years from now). Individual Living Lab goals were developed while taking into consideration recommendations from the external evaluators, as well as the core strengths, weaknesses, opportunities, and threats of the Living Labs. This approach was selected because clear and specific goals lead to greater output and thus helped in devising a plan to achieve the desired results.

Each project Living Lab was directly involved in the goal setting process, which in return, increased commitment and motivation of the teams to attain their goals. In fact, willingness to achieve the goals was also increased because the long-term goals were set taking into consideration the individual characteristics of each Living Lab. The long-term goals of individual Living Labs are presented in this section while concrete actions to achieve these goals are described in Chapter 5.

Fig. 10: Dublin Living Lab presenting their future plans, 15 March 2019, Vantaa (Finland)



Bologna Living Lab

“The long-term goal of the Bologna Living Lab is to extend its life and original concept - embracing new themes to stay at pace with the current trends in sustainability and environmental consciousness. Our approach is fully demonstrated presenting what we did with the Open-Air Laboratories (OALs) in the OPERANDUM (OPEn-Air LaboRatories for Nature based solUTions to Manage environmental risks), an H2020 project, whose concept extends and embraces the Living Lab concept for enhanced exploitation in natural and rural areas.” Silvana Di Sabatino, Associate Professor, UNIBO

Strategic Goal 1: Become the main reference point on air quality and climate change for local stakeholders

Because of the solid scientific background and expertise in various air pollution and climate change topics, the Bologna Living Lab is already fairly well-known in the scientific community. However, becoming a reference point for local stakeholders on these topics requires more than scientific knowledge and, therefore, tailored approaches to collaboration and communication of the scientific findings to local stakeholders need to be developed. The skills and knowledge obtained during the project provide a great starting point for this purpose. In fact, to reach this strategic goal, the Living Lab is already developing communication skills targeted at non-technical audiences which will be continued in the future. The fact that Bologna is well-known for its fight against air pollution and climate change challenges aids the team in achieving their first strategic goal.

Strategic Goal 2: Obtain funding for new projects related to air quality and climate change topics

During the course of the project, the Living Lab has grown and new personnel have been hired. However, to sustain the team and facilitate further growth of the Living Lab, new funding for Living Lab activities needs to be obtained. This could be achieved through the application of the scientific expertise of the Living Lab to new projects and initiatives related to air quality and climate change.

Strategic Goal 3: Develop new knowledge by generalizing and harmonizing the project results and methods for further applications

Generalization and harmonization of the methodologies established and results obtained by the Living Lab provide great opportunities to extend the Living Lab's knowledge beyond the iSCAPE project. Therefore, the Living Lab aims to apply its scientific expertise and working approaches to contexts and aspects other than those researched during the project. As such, the skills and methodologies learned during the project serve as a great starting point for achieving the third strategic goal.

Bottrop Living Lab

“The strategic vision of the Bottrop Living Lab is a self-sustaining, vital lab structure that not only allows a continuous implementation of Wandering Tree activities, but is also open for other topics in accordance to the expressed needs of our local stakeholders. Sharing and transferring our Living Lab experiences to other cities is also part of our mission.”
Stefan Greiving, Head of IRPUD, TUDO

Strategic Goal 1: Sustain Wandering Trees activities beyond the project

To increase awareness of air quality, the Living Lab aims to organize Wandering Trees activities continuously. As a regular activity, the Wandering Trees would bring together local residents annually and contribute to the positive image building of the Bottrop city beyond its borders. The experience gained during the iSCAPE project helps to save organisational resources in the long term while enabling the team to come up with new ideas and exciting activities and thus, attracting and engaging new participants.

Strategic Goal 2: Establish a self-sustaining Living Lab structure taking into consideration the interests and needs of local stakeholders

The Living Lab aims at establishing a structure that is self-sustaining. To achieve this, the Living Lab should be designed such that it enables the team to respond to the current issues and address new urban challenges in a flexible manner. This would also require establishing a core team to ensure consistency in managing and overseeing Living Lab activities, as well as an open stakeholder engagement policy.

Strategic Goal 3: Exchange with experiences and transfer the Living Lab knowledge to other cities

The Living Lab is a space of opportunities for innovative ideas and a constant learning process. Exchanging knowledge and experiences between Living Labs from other cities, provides all teams with great benefits, including potential collaboration opportunities. For this purpose, one of the Living Lab's objectives is to become an official member of ENoLL.

Dublin Living Lab

“Solving complex urban challenges requires close collaboration across scientific disciplines and both the public and private sector. It also requires individual actions. In Dublin Living Lab, we create shared meanings and joint values by bringing together citizens, research institutions, businesses, and public authorities to solve these real-world challenges. For years to come, I see Dublin Living Lab playing an important role in the regional innovation ecosystem, enabling experimentation, and co-creation for the collective betterment of our lives.” Francesco Pilla, Associated Professor, UCD

Strategic Goal 1: Become an integral part of the regional innovation ecosystem

To develop a strong value proposition for its key stakeholders, the Living Lab aims to become an active member of the regional innovation ecosystem by leveraging its network and established working relationships with the Smart Dublin and Smart Docklands initiatives. Being part of a bigger picture not only provides the Living Lab with new funding sources and collaboration opportunities, but also enables the team to contribute to solving increasingly complex urban challenges.

Strategic Goal 2: Attract funding through project grants and collaborations with industry

To sustain Living Lab activities, the team aims to seek additional funding by developing new project proposals that embrace the Living Lab mindset and are built upon the core principles of Living Labs, including multi-stakeholder collaboration, human-centered innovation, as well as experimentation in real-life setting.

Strategic Goal 3: Build on momentum to increase citizen engagement through co-creation

The Living Lab aims to ensure that people’s voices are heard when developing solutions to urban challenges by integrating research and innovation processes and placing citizens at the center of smart and sustainable urban development. This can be achieved through new Living Lab projects and initiatives developed based on the Living Lab’s skills and previous experience with citizen engagement and co-creation.

Guildford Living Lab

“Some of the short-term Guildford Living Lab objectives include running important trials across Guildford and neighbouring areas to reduce air pollution. The results would act as evidence while communicating with the policymakers. This would eventually help in influencing policies at regional as well as national level. One of the long-term objectives is to build a strong Citizen Science community that would help in solving problems and delivering solutions that would benefit the community. Another future objective is to work on climate change as well as dig deep into areas like landscaping. The aim is to be a leading air pollution Living Lab to drive activities across the UK and Europe.”

Prashant Kumar, Professor and the founding Director of the GCARE, UoS

Strategic Goal 1: Become a leading Living Lab to drive activities pertaining to indoor and ambient air pollution across UK

Guildford Living Lab follows an integrated human-centred approach, collaborating with citizens, communities, stakeholders, and researchers to tackle serious problems of indoor and ambient air pollution. The multidisciplinary nature of the team enables Guildford Living Lab to come up with interesting and innovative ideas that not only solve various complex problems but also helps the Living Lab to realize its full potential. Over the past few years, as a part of the iSCAPE project, Guildford Living Lab has shown its commitment to targeting specific areas related to various air pollution topics and solving problems that can actually make a difference to the society. Hence, Guildford Living Lab aims to continue the work it has been doing beyond the iSCAPE project, and by expanding its relationships, Guildford Living Lab aspires to achieve long-term sustainability and become an integral part of a local ecosystem that actively works towards empowering citizens and communities. To achieve this, the team will also strive for internationalisation of the Living Lab activities by building new project consortiums.

Strategic Goal 2: Develop a self-sustaining financial model to support Living Lab activities

Global Centre for Clean Air Research (GCARE) manages Guildford Living Lab in close partnership with the administration at the University of Surrey (UoS). Therefore, Guildford Living Lab has been well supported and advised by partners within the university. However, to ensure self-sustainability, Guildford Living Lab aims to develop a new business model based on novel proposals and ideas for research grants. To sustain the Living Lab beyond the iSCAPE, Guildford Living Lab will apply Living Lab outcomes and tools to new projects and initiatives as a vehicle for its field trials. In addition to that, resources from local funding sources (e.g. from UoS) and support of the established partnerships, including city councils, will be leveraged to ensure the sustainability of the Living Lab after iSCAPE.

Strategic Goal 3: Influence policy changes locally and nationally

During iSCAPE, Guildford Living Lab has organized several citizen engagement and co-creation activities with a great diversity of participants, including students, community members, and policymakers. Based on this experience, the Living Lab aims to engage with even a larger range of people from different backgrounds and administrative levels. Such activities would help in attracting interest from influential user groups, which in return would lead to a dialogue with legislators and policymakers, thus, influencing policy changes on both local and national levels.

Hasselt Living Lab

“The mission of the Hasselt Living Lab is to develop tools and solutions to cater mobility issues by involving citizens and city authorities. I foresee Hasselt Living Lab as a center of excellence in mobility solutions and making transport research and innovation more accessible to the cities and regions.”

Muhammad Adnan, Senior Researcher, Transportation Research Institute (IMOB), UH

Strategic Goal 1: Become a leader in transport-related Living Lab methodology

Due to continuous advancements in the transport sector, people commute more and more on a daily basis. This has caused various problems not only for humans, but also for the environment. In order to tackle and mitigate these problems, strong coordination is required between the citizens, scientists, and policy makers. Given the depth and breadth of expertise in addition to 15 years of experience of the research institute managing the Living Lab, the team aims to provide novel solutions to contemporary mobility and traffic safety challenges by adopting the Living Lab methodology. In addition, Hasselt Living Lab aims to establish strong relationships and collaboration with local and regional organizations and institutes working on sustainable and healthy mobility. These include IDM (Institute for Sustainable Mobility) at the University of Ghent, POLIS (Cities and Regions for Sustainable Transport), and VITO (Flanders institute for technological research). Moreover, the Living Lab aims to become an official member of the ENOLL network.

Strategic Goal 2: Fully integrate the Living Lab methodology within the product development domain of the institute

The Living Lab is operating under the umbrella of Transportation Research Institute (IMOB) whose main focus is to design tools and products for safe, healthy and environmentally friendly transportation. Currently, some Living Lab principles are followed when developing new tools and products, for example, Route2school (www.route2school.be). However, the team's goal is to fully integrate the Living Lab methodology in the development cycle and ensure that all the current/future tools and products that are developed by IMOB follow the Living Lab methodology. This will be achieved by applying the Living Lab approach to future projects and involving end-users in the co-creation process.

Vantaa Living Lab

“ I see that more and more of FMI’s research groups will be involved in Living Lab activities. This is actually very potential because it looks like many funding agencies actually require the multi-stakeholder interactions in many societal levels. Therefore, I am happy that the FMI’s iSCAPE team can be of great support here for the whole FMI! ”

Antti Mäkelä, Head of Climate Change and Extreme Weather Research Group, FMI

Strategic Goal 1: Establish the Living Lab as a real-time instrument for FMI research

FMI’s research is heavily dependent on external research funding. However, it has been noted that the need for engagement with various end-users and stakeholders in research has increased tremendously during the past few years, partly due to the requirements of funding instruments. Therefore, one important strategic goal of FMI is to take advantage of the gained Living Lab expertise in future research proposals, and, eventually, integrate the Living Lab approach into everyday research activities of FMI. The established reputation and trust amongst various end-users and stakeholders contribute greatly to achieving this goal.

Strategic Goal 2: Strengthen working relationships with the Vantaa municipality

Now, when the cooperation has been successfully established with the city of Vantaa, FMI will support and work closely with the city in the future. FMI has already a well-established track-record of working with other Finnish cities, especially, the city of Helsinki. The experience and knowledge developed through collaboration with the city of Helsinki in areas related to climate change adaptation will be put into action in Vantaa. This involves the building of solid relationships, being a trusted advisor and a link between the municipality and citizen groups, and ultimately establishing a more collaborative way of working.

Strategic Goal 3: Become a nationally recognised expert in urban climate modelling

The modelling work done for the city of Vantaa during the iSCAPE project has given excellent new understanding of the capabilities of high-detail climate simulations at a street level. This provides FMI with great opportunities to take the next step and apply the simulation tools to forth-coming projects, especially those that research the role of green infrastructure in the adaptation to climate change in Finnish cities. The fact that there are not many Finnish players in this field of research, would help FMI to gain recognition of being an experienced expert in urban climate modelling.

5. Actionable Plan: How Do We Get There?

The next step in strategic planning conducted by all the project Living Labs was the development of the individual action plans. To achieve the defined strategic goals, each Living Lab developed a plan of how to get from where they are now, to where they want to be in the future.

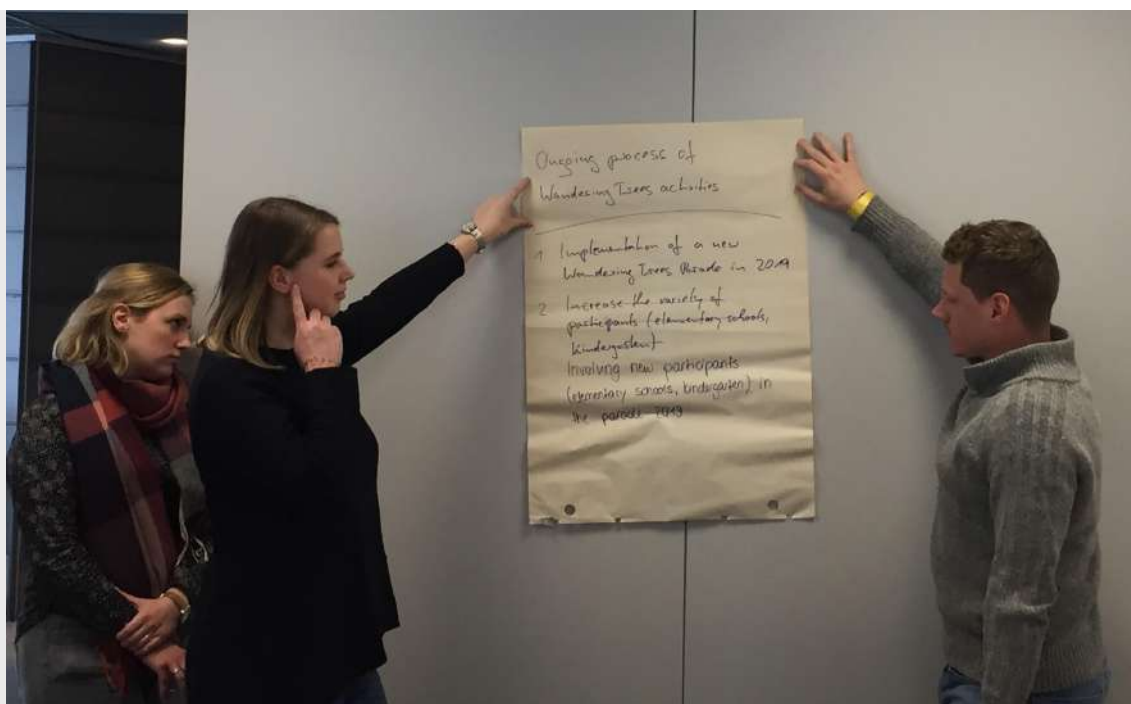
To demonstrate the commitment of the Living Labs and their willingness to sustain the developed skills and knowledge beyond the iSCAPE project, this chapter provides an overview of concrete activities conducted by the Living Labs during the project (Section 5.2) in addition to providing an overview of their plans (Section 5.1).

5.1. Individual Living Lab plans

This section presents the final versions of the individual Living Lab plans and provides an overview of the activities that each Living Lab plans to undertake in order to achieve their strategic goals. Creating these plans involved setting SMART (Specific, Measurable, Attainable, Relevant, and Timely) objectives and identifying available support and required resources in addition to describing the expected outcomes.

The individual action plans were developed in several iterations. Firstly, the Living Labs discussed their action plans during the workshop organized as part of the project meeting in Vantaa, Finland (15 March 2019). Next, these plans were further refined; taking into consideration the recommendations of the external evaluators, as well as the guiding principles presented in Section 4.1.

Fig. 11: Bottrop Living Lab presenting their action plan for one of their strategic goals, 15 March 2019, Vantaa (Finland)



Bologna Living Lab

Strategic goal 1

Become the main reference point on air quality and climate change for local stakeholders

Organize a workshop with local stakeholders to inform about the main iSCAPE results

Due date: December 2019

Available support:

- Strong connection with ARPAE
- Vast network of connections

Resources required:

- Staff (Living Lab leaders and researchers contributing to the realization of the campaigns and the simulations)

Expected outcome:

- The importance of the results obtained discussed
- Opportunities to extend the collaboration identified
- The role of the Living Lab in the regional and local panorama discussed

Publish at least 4 scientific papers in peer-reviewed journals focusing on the main results of the iSCAPE project

Due date: March 2020

Available support:

- Scientific expertise in fluid dynamics, dispersion modelling, air pollution, urban meteorology and climatology

Resources required:

- Staff (researchers)
- Funding to publish in open access journals
- Time

Expected outcome:

- The research expertise and credibility of findings demonstrated
- The visibility of the iSCAPE project increased
- Scientific credibility of the project findings increased

Publish articles on local and national press regularly

Due date: Continuous

Available support:

- Vast network of connections
- Communication skills

Resources required:

- Staff (researchers)
- Funding
- Time

Expected outcome:

- Increased awareness on air pollution and climate change topics
- Increased visibility of the iSCAPE project, especially expertise of the Bologna Living Lab

Strategic goal 1

Improve communication with citizen networks, other Living Labs, and local stakeholders

Due date: Continuous**Available support:**

- Vast network of collaborations
- Cooperation with Living Labs and citizen networks

Resources required:

- Staff (researchers)
- Time

Expected outcome:

- Visibility of the research group increased
- Project scientific findings to the key stakeholders effectively disseminated
- Opportunities to collaborate and develop new research ideas identified

Strategic goal 2

Obtain funding for new projects related to air quality and climate change topics

Participate in at least 2 scientific conferences

Due date: March 2020**Available support:**

- Scientific expertise in fluid dynamics, dispersion modelling, air pollution, urban meteorology and climatology
- Network of scientific communities

Resources required:

- Staff
- Funding

Expected outcome:

- The project results disseminated
- Capabilities and abilities to apply scientific research to multi-disciplinary projects demonstrated
- Increased visibility of the research group
- Increased visibility of the project results
- Increased opportunities to obtain project funding

Enlarge the network of scientific collaborators

Due date: March 2020**Available support:**

- Scientific expertise in fluid dynamics, dispersion modelling, air pollution, urban meteorology and climatology
- Network of scientific communities

Resources required:

- Personnel
- Time
- Funding

Expected outcome:

- The fields of research application enhanced and extended
- New collaboration opportunities identified
- Opportunities to apply methodologies and project results to other scientific contexts identified

Strategic goal 2

Prepare at least 2 new project proposals to obtain funding from national and international funding schemes**Due date:** March 2020**Available support:**

- Scientific expertise in fluid dynamics, dispersion modelling, air pollution, urban meteorology and climatology
- Network of scientific communities
- Network of local stakeholders
- Communication skills

Resources required:

- Personnel
- Time

Expected outcome:

- Increased visibility of the research group
- New collaboration areas and application fields for scientific expertise identified
- Funding to hire new personnel to enlarge the group and its focus areas obtained

Stay updated with the international phenomena on air quality and climate change topics**Due date:** Continuously**Available support:**

- Scientific expertise in fluid dynamics, dispersion modelling, air pollution, urban meteorology and climatology
- Network of scientific communities

Resources required:

- Personnel
- Time

Expected outcome:

- Up-to-date on the current trends and needs of the scientific community
- New project opportunities identified

Strategic goal 3

Develop new knowledge by generalizing and harmonizing the project results and methods for further applications**Generalize and harmonize the results obtained by the Living Lab during the iSCAPE project****Due date:** March 2020**Available support:**

- Communication skills
- Vast network of collaboration

Resources required:

- Staff (researchers)
- Funding
- Time

Expected outcome:

- New knowledge developed and disseminated to local stakeholders

Strategic goal 3

Publish at least 4 scientific papers based on the key project findings**Due date:** March 2020**Available support:**

- Scientific expertise in fluid dynamics, dispersion modelling, air pollution, urban meteorology and climatology

Resources required:

- Staff (researchers)
- Funding to publish on open access journals
- Time

Expected outcome:

- Visibility of the scientific expertise of the Living Lab increased
- Generalized and harmonized project findings disseminated to the scientific community

Identify new projects with an enlarged vision and new application areas, linked to air quality and climate change topics**Due date:** March 2020**Available support:**

- Scientific expertise in fluid dynamics, dispersion modelling, air pollution, urban meteorology and climatology
- Vast network of collaboration

Resources required:

- Staff (researchers)
- Time

Expected outcome:

- Relevant project calls and application areas identified
- Scientific reputation in the field of air pollution and climate change enhanced

Bottrop Living Lab

Strategic goal 1

Sustain Wandering Trees activities beyond the project

Implement a new Wandering Trees Parade in 2019

Due date: Undertaken (May 2019)

Available support:

- Skills and expertise in Living Lab management -Workshop materials and tools developed during iSCAPE
- Established collaboration with the city administration, local businesses, citizens and associations
- High willingness of people to participate due to the positive feedback of the first Wandering Trees Parade

Resources required:

- Staff
- Funding
- Time

Expected outcome:

- Awareness of air pollution and the urban heat island effect increased
- The process and approach to implementing the Wandering Trees activities revised and improved
- Collaboration with the city stakeholders strengthened

Involve new participants (especially children from local primary schools, kindergartens) in the parade of 2019

Due date: Undertaken (May 2019)

Available support:

- Strong connection of the city administration to primary schools
- High willingness to participate due to the positive feedback of the first Wandering Trees Parade

Resources required:

- Staff
- Funding
- Time

Expected outcome:

- A new target group for the Living Lab activities engaged
- Awareness of air pollution and the urban heat island effect amongst young people increased

Identify funding opportunities for the upcoming parade in 2020

Due date: May 2020

Available support:

- Previous experience of the city administration in applying for subsidies programmes (e.g. urban development funding)

Resources required:

- Staff
- Time

Expected outcome:

- Relevant funding programmes and their conditions of eligibility identified
- Funding for Living Lab activities received

Strategic goal 2

Establish a self-sustaining Living Lab structure taking into consideration the interests and needs of local stakeholders

Found a self-committed stakeholder network with at least 20 members

Due date: December 2019

Available support:

- Established working relationships with key stakeholders from different stakeholder groups

Resources required:

- Staff (coordination, researchers, civil society, administration, local businesses)
- Time

Expected outcome:

- Living Lab organizational structure improved
- Citizen engagement fully integrated into team's working approach
- A pool of citizens interested in co-creation activities developed

Hold at least 2 regular meetings per year

Due date: Continuous

Available support:

- Coordination skills of the Living Lab management team

Resources required:

- Staff (coordination, researchers, civil society, administration, local businesses)
- Time
- Premises

Expected outcome:

- Living Lab organizational structure improved
- Citizen engagement fully integrated into team's working approach
- A pool of citizens interested in co-creation activities developed

Identify relevant, demand-driven topics/ issues for further Living Lab activities

Due date: Continuous

Available support:

- Scientific expertise
- Administrative expertise
- Local knowledge

Resources required:

- Staff (researchers, civil society, administration, local businesses)
- Time

Expected outcome:

- Further development opportunities of the Living Lab identified
- Motivation, interest, and commitment of the Living Lab team maintained

Strategic goal 3

Exchange with experiences and transfer the Living Lab knowledge to other cities

Become an official member of ENoLL

Due date: December 2020**Available support:**

- Collaboration with ENoLL within the iSCAPE project

Resources required:

- Staff (researchers)
- Funding

Expected outcome:

- Future collaboration opportunities identified

Participate in at least 2 networking events or conferences

Due date: December 2020**Available support:**

- Previous experience in participating in conferences e.g. the Dortmund Conference on Spatial Planning and Planning Research 2018
- Previous experiences in organizing a partner event at the EU Green Week 2018 and 2019
- Established collaboration with ENoLL (e.g. as part of the Open Living Lab Days 2019)

Resources required:

- Staff
- Funding (conference fees)
- Time

Expected outcome:

- Experience with other Living Labs shared
- Future collaboration opportunities identified

Publish at least 3 scientific papers

Due date: December 2020**Available support:**

- Scientific expertise in urban planning, air pollution and urban climate

Resources required:

- Staff (researchers)
- Funding to publish on open access journals
- Time

Expected outcome:

- Awareness of Living Lab activities and air pollution topics increased
- Research expertise and outcomes of the Living Lab shared with the scientific community

Publish articles in local, regional, and national press regularly

Due date: Continuous**Available support:**

- Established relationships with the press

Resources required:

- Staff
- Time

Expected outcome:

- Visibility of Living Lab activities and awareness of air pollution topics increased
- Outcomes of the Living Lab work shared with the general public

Dublin Living Lab

Strategic goal 1

Become an integral part of the regional innovation ecosystem

Pilot a joint collaboration project with the key local stakeholders, including the city council and Dublin-based companies

Due date: December 2019

Available support:

- Large collaborator network
- Established working relationships with key stakeholders
- Previous experience and skills in leading multi-stakeholder projects

Resources required:

- Staff (researchers, community manager)
- Project sponsor/ funding

Expected outcome:

- Processes and an approach to collaboration tested
- The role of the Living Lab in the regional innovation ecosystem discussed
- Future collaboration opportunities identified

Synergize Living Lab activities with the Smart Dockland program, focusing on common areas of interest

Due date: December 2020

Available support:

- Established working relationships and direct contact with the initiative leads
- Skills and expertise of the Living Lab team (e.g. smart city, smart technology and smart citizens)

Resources required:

- Staff (initiative coordinator)
- Time

Expected outcome:

- Common areas of interest identified
- Collaboration approach developed
- New project proposals discussed

Synergize Living Lab activities with the Smart Dockland program, focusing on common areas of interest

Due date: December 2021

Available support:

- Established working relationships and direct contact with the initiative leads
- Skills and expertise of the Living Lab team (e.g. smart city, smart technology and smart citizens)

Resources required:

- Staff (initiative coordinator)
- Time

Expected outcome:

- Living Lab activities integrated into a regional innovation ecosystem

Strategic goal 1

Disseminate achievements and outcomes of the Living Lab regularly**Due date:** Continuous**Available support:**

- Established online presence
- Previous experience in participating in public events, forums, panels

Resources required:

- Staff
- Time

Expected outcome:

- Visibility of the Living Lab and awareness of its activities increased

Strategic goal 2

Attract funding through project grants and collaborations with industry**Identify and assess at least three relevant European (e.g. H2020) and/ or national funding schemes/ project calls****Due date:** August 2019**Available support:**

- Extensive project management and grant writing experience
- The team coordinates the iSCAPE project and is part of 2 other H2020 projects

Resources required:

- Staff (project manager/research administrator)
- Time

Expected outcome:

- Relevant project calls identified
- Call requirements discussed
- Potential partnerships considered

Identify opportunities to collaborate with industry and develop 1 project proposal**Due date:** August 2019**Available support:**

- Large collaborator network
- Previous experience in collaborating with industry

Resources required:

- Staff (project manager/research administrator)
- Time

Expected outcome:

- Collaboration agreement signed

Submit 2 project proposals with a budget share of at least 120,000 euros**Due date:** March 2020**Available support:**

- Extensive project management and grant writing experience
- Large collaborator network

Resources required:

- Staff (project manager/research administrator)
- Time

Expected outcome:

- Successful proposal submission
- New funding sources obtained

Strategic goal 3

Build on momentum to increase citizen engagement through co-creation

Realize at least 2 citizen engagement activities/ co-creation workshops

Due date: November 2019

Available support:

- Workshop materials and tools developed during iSCAPE
- Established collaboration with local communities, schools, and NGOs

Resources required:

- Staff (workshop facilitators)
- Time

Expected outcome:

- Increased awareness of air pollution and ways to control it
- Increased awareness of the importance and benefits of citizen engagement when solving complex urban challenges

Develop a long-term citizen engagement strategy

Due date: December 2020

Available support:

- Established collaboration with local communities, schools, NGOs
- Previous experience in Living Labbing and supporting bottom-up initiatives

Resources required:

- Staff (project manager/research administrator)
- Time

Expected outcome:

- Citizen engagement fully integrated into team's working approach
- A pool of citizens interested in co-creation activities developed

Guildford Living Lab

Strategic goal 1

Become a leading Living Lab to drive activities pertaining to indoor and ambient air pollution across UK

Share and publicize project results and the case studies of the Living Lab by a range of means (online, scientific papers, conversations)

Due date: Continuous

Available support:

- Vast and strong network of connections
- Skills and expertise of the Living Lab team

Resources required:

- Staff (researchers)
- Funding (open access journals, conference fees, travel fees, etc.)
- Time

Expected outcome:

- Scientific papers with the main results obtained in the project published
- Visibility of the Living Lab and its activities increased
- Project results disseminated to the key Living Lab stakeholders
- Increase the collaborator network by building new connections

Engage with the public through a range of channels (press, social media, public events)

Due date: Continuous

Available support:

- Established collaboration via different workshops and co-creation activities
- Previous experience in public engagement

Resources required:

- Staff (project manager/administration/researchers)
- Time

Expected outcome:

- Awareness of air pollution mitigation increased
- Visibility of the Living Lab activities enhanced
- Greater diversity of participants achieved

Identify influential stakeholder groups through 1:1 meeting with city stakeholders

Due date: Continuous

Available support:

- Large collaborator network
- Established working relationships with key stakeholders
- Previous experiences and skills in leading multi-stakeholder projects

Resources required:

- Staff (researchers)
- Project sponsor/ funding
- Time

Expected outcome:

- Opportunities to extend the collaboration identified
- The role of the Living Lab in the local ecosystem discussed with the key stakeholders

Strategic goal 2

Develop a self-sustaining financial model to support Living Lab activities

Identify new collaboration opportunities with national and international partners

Due date: Continuous**Available support:**

- Previous experience in collaborating with national and international bodies
- Scientific knowledge and expertise

Resources required:

- Staff (researchers and administration)
- Funding
- Time

Expected outcome:

- Potential partnerships considered
- Further opportunities to collaborate and develop novel proposals and ideas for research grants identified
- Reputation and the motivation of the team enhanced

Develop at least 2 new project proposals prepared to obtain internal/external funding

Due date: January 2020**Available support:**

- Scientific knowledge, expertise, and instrumentations in any experimental and modelling activities related to air pollution mitigation
- A vast national/international network of scientific communities
- Network of local stakeholders

Resources required:

- Staff (project manager/ researchers/ administrations)
- Time

Expected outcome:

- Research activities further enhanced
- Funding to maintain the current team and/or hire new members to enlarge the team scope obtained

Strategic goal 3

Influence policy changes locally and nationally

Identify gaps in air quality legislation and opportunities for improvement, meeting with legislators/ policy-makers bi-annually

Due date: Continuous**Available support:**

- Previous expertise of the Living Lab in collaborating with policy and decision-makers

Resources required:

- Staff (Living Lab leaders and researchers)
- Funding
- Time

Expected outcome:

- Relationships with the GBC strengthened
- New opportunities for the development of guidances / recommendations identified
- Working relationships with policy/decision-makers strengthened

Strategic goal 3

Collaborate with policy-designers on a regular basis

Due date: Continuous**Available support:**

- Vast network of collaborations, including GBC, other Living Labs, and citizen networks

Resources required:

- Staff (researchers)
- Time

Expected outcome:

- Research outcomes transferred directly to policy-designers
- Room for improvement in collaboration and new project opportunities with public authorities identified
- New national legislations developed

Hasselt Living Lab

Strategic goal 1

Become a leader in transport-related Living Lab methodology

Become an official member of the ENoLL network, receiving the ENoLL Living Lab label connecting with the network members

Due date: December 2020

Available support:

- Experienced staff that organize/ conduct activities such as citizens recruitment, co-creation, and citizen science

Resources required:

- Funding
- Time

Expected outcome:

- Recognition of the Living Lab by the community of ENoLL Living Labs achieved

List the Living Lab as a transport-related Living Lab on the ENoLL channels, communicating its expertise and knowledge to potential collaborators and Living Lab stakeholders

Due date: December 2020

Available support:

- Experienced and professional Living Lab Team

Resources required:

- Time of the communication team

Expected outcome:

- Visibility of the Living Lab in the transport sector at the European level increased

Attend events & networking activities (e.g ENoLL Open Living Lab Days 2019)

Due date: Continuous

Available support:

- Experience in Living Labbing gained during the iSCAPE project

Resources required:

- Event registration and travel costs

Expected outcome:

- Knowledge about current practices of Living Labs deepened

Disseminate information about Living Lab activities locally and nationally, as well as communicate the Living Lab methodology at the institutional level via website or presenting the outcomes of pilots through various forums e.g VLEVA (Liaison agency Flanders-Europe)

Due date: Continuous

Available support:

- Strong connections with professional experts, city officials and consultant related to transport sector
- Experience in Living Lab activities based on iSCAPE and other EU-funded projects

Resources required:

- Communication experts
- IT professionals
- Funding/ sponsorship
- Time

Expected outcome:

- Visibility of the Living Lab in the transport sector increased

Strategic goal 2

Fully integrate the Living Lab methodology within the product development domain of the institute

Benchmark the active Living Labs in Belgium leveraging the established collaboration ENoLL and present the results during the IMOB strategic meeting

Due date: December 2019**Available support:**

- Experience and skills of the Living Lab staff gained during the past years
- Established collaboration with ENoLL

Resources required:

- Staff
- Time

Expected outcome:

- Awareness of the Living Lab methodology within the institute increased and a potential action plan discussed

Deepen the understanding of the current system for product development and map out who needs to be engaged

Due date: December 2019 (next bi-annual strategic meeting)**Available support:**

- Experience and skills of the Living Lab staff gained during the past years

Resources required:

- Staff
- Time

Expected outcome:

- Strategic plan drafted
- Contacts with internal decision-makers and stakeholders strengthened

Develop a business plan to achieve the goal by the bi-annual strategic meeting in 2020

Due date: May 2020**Available support:**

- Experience and skills of the Living Lab staff gained during the past years

Resources required:

- Support from the Business development team
- Time

Expected outcome:

- Business plan developed and formally approved

Pilot the integrated Living Lab methodology

Due date: December 2020**Available support:**

- Experience and skills of the Living Lab staff gained during the past years

Resources required:

- Staff for the pilot with relevant expertise
- Pilot project funding

Expected outcome:

- Integrated methodology tested
- Improvement opportunities identified

Vantaa Living Lab

Strategic goal 1

Establish the Living Lab as a real-time instrument for FMI research

Identify at least 2 innovative, academic research project calls and submit project proposals in the area of health and climate change that require multi-stakeholder collaboration with partner institutes, healthcare professionals, social service providers, and citizens

Due date: Undertaken (April 2019)

Available support:

- Established relationships with other FMI research groups and other Finnish research institutes

Resources required:

- Staff
- Time

Expected outcome:

- Participation in new project consortia established
- Two project proposals submitted

Develop a common understanding of the needs and benefits of living labbing for FMI research

Due date: December 2019

Available support:

- Skills and expertise in Living Labs gained during iSCAPE
- Connections to established Finish Living Labs such as Forum Virium

Resources required:

- Staff (FMI iSCAPE experts)

Expected outcome:

- A common definition of FMI's Living Lab (what it is, and what it is not) developed
- Internal awareness of the benefits of Living Labs increased
- Areas for application of the Living Lab methodology identified

Increase the Living Lab collaborator network by building new relationships and partnerships with Finnish research institutes, academia, public authorities and organizations, as well as citizen groups

Due date: Continuous

Available support:

- Experience gained within iSCAPE

Resources required:

- Staff
- Time

Expected outcome:

- New partnerships and collaborations established
- Opportunities for joined research activities identified
- Visibility of the Living Lab activities increased

Strategic goal 2

Strengthen working relationships with the municipality

Organize at least 2 face-to-face events and meetings with the Vantaa municipality to network and disseminate the outcomes of Living Lab activities

Due date: December 2019**Available support:**

- Established connection with the municipality during the project
- Support from other FMI research groups

Resources required:

- Staff
- Time for planning what is expected from the event(s)

Expected outcome:

- Relationships with the Vantaa municipality strengthened
- New opportunities for joint initiatives and research identified
- Awareness of the Living Lab activities increased
- Project outcomes disseminated

Gather lessons learned from the collaboration with other Finnish cities, especially Helsinki

Due date: December 2019**Available support:**

- FMI's iSCAPE staff

Resources required:

- Time
- Staff

Expected outcome:

- Room for improvement in collaboration with public authorities identified

Develop a new joint initiative in the area of health and climate change

Due date: May 2020**Available support:**

- Skills and experience gained during iSCAPE

Resources required:

- Staff
- Time
- Funding/ sponsor for the initiative

Expected outcome:

- Common areas of interest identified
- Clear roles and responsibilities defined
- Project implementation initiated

Strategic goal 3

Become a nationally recognized expert in urban climate modelling**Organise a national “Urban climate” seminar at FMI targeting other researchers, city stakeholders and planners****Due date:** Autumn 2020**Available support:**

- FMI’s iSCAPE staff
- Other Finnish research institutes (esp. Finnish Environmental Institute and Finnish Health Institute)

Resources required:

- Time
- Organisational resources (these are available from FMI)

Expected outcome:

- Gained reputation in urban climate modelling expertise

Identify academic or practical research possibilities and succeed in submitting at least 1 project proposal in the area of health and/or climate change that require multi-stakeholder collaboration**Due date:** December 2020**Available support:**

- Skills and experience gained during iSCAPE
- FMI’s other research groups

Resources required:

- Time for identifying possibilities and writing winning proposal

Expected outcome:

- Results of urban climate modelling used in practice (e.g. in climate change adaptation and health)

5.2. Activities accomplished during the project

This section provides an overview of the activities that each Living Lab accomplished during the course of the project with the aim to demonstrate their commitment to achieving the high-level goals and action plans.

During the spring and summer of 2019, the Living Labs dedicated significant efforts and applied their skills and knowledge to various initiatives to sustain their operations beyond the project. These activities included dissemination of the Living Lab results to increase visibility and impact, as well as citizen and local stakeholder engagement activities to increase momentum and enhance the established collaborations. The Living Labs also leveraged their infrastructure and equipment to expand their operations and explore synergies with existing projects in addition to developing new projects to obtain funding for Living Lab activities after the completion of the iSCAPE project.

To provide a comprehensive overview of the activities accomplished, the list of activities includes not only an activity description, but also provides a description of the achieved outcomes.

Fig. 12: Francesco Pilla, Dublin Living Lab lead, participating in a panel discussion held during the Future Scope, 28 March 2019, Dublin (Ireland)



Fig. 13: Wandering Trees Parade 2019 organized by Bottrop Living Lab, 18 May 2019, Bottrop (Germany)



Fig. 14: Deployment of a Living Lab station near the local school to monitor air quality by Hasselt Living Lab, July - September 2019, Hasselt (Belgium)



Bologna Living Lab



“Looking back at the Living Lab activities since it was born, I can see clearly how it slowly, but constantly grew. Introducing new members to the Living Lab and enhancing its original skillset to be more communicative and keen to co-create and discuss, builds a stronger connection with a non-technical audience, including local stakeholders. We learned a lot during this path, and this constant learning in a slightly different field than our original one is supporting and sustaining the Living Lab to continue its activities and to have more workshops, co-creation events, and experiments in the future. The possibility to build synergies with new projects embracing the Living Lab concepts will help us to foster and sustain our Living Lab.”

Silvana Di Sabatino, Associate Professor, UNIBO

Dissemination Activities

Activity	Description	Outcome
<p>What? Participation in the launch conference of the LIFE Veg-Gap project (VEGetation for urban Green Air quality Plans)</p> <p>When? 27 February 2019</p> <p>Where? Lecture Hall of the Accademia Belle Arti, Bologna</p>	<p>In February 2019, Bologna Living Lab participated in the launch conference of the EU-funded LIFE Veg-Gap project (VEGetation for urban Green Air quality). During this event, the main results obtained during the iSCAPE project and plans for the future were presented and discussed. In addition, the team members along with representatives from other projects who focus on topics related to air pollution and green infrastructure were invited to participate in a networking session.</p>	<p>This event and the networking session in particular was a great opportunity to extend the network of collaborators, as well as find new ideas to generalize and extend the results obtained during the project.</p>

Dissemination Activities

Activity	Description	Outcome
What? Preparation of 4 scientific publications to disseminate the key project findings When? June-July 2019 Where? Bologna	In summer 2019, Bologna Living Lab worked hard to prepare 4 scientific publications. These publications include the results produced during the course of the project and describe key findings on photocatalytic coating, green infrastructure, and ventilation in urban street canyons. They will be submitted to peer-reviewed journals, such as Science of the Total Environment, Boundary-Layer Meteorology, or Atmospheric Environment.	This activity helps to generalize and harmonize the results obtained by the Living Lab during the iSCAPE project. It also helps to identify further application areas. In addition, scientific work and visibility enable the team to grow the network of collaborations and be involved in further project proposals.
What? Preparation of posters (5) and presentations (5) for the National Conference of the Italian Association of Atmospheric Science and Meteorology When? June-July 2019 Where? Bologna	In summer 2019, Bologna Living Lab dedicated significant efforts to prepare the posters and presentations for the National Conference of the Italian Association of Atmospheric Science and Meteorology to be held in September 2019 in Naples, Italy. The main results obtained during the iSCAPE project in addition to some extensions and further applications will be presented by the team during the conference.	This activity will help to improve the visibility of the Living Lab and its expertise in various aspects of air quality and climate change at the national level. The event is also a great networking opportunity and enables the team to discuss future collaboration opportunities with other scientists and research organizations.
What? Release of interviews and articles on local and national press, broadcast and newspapers When? Continuously Where? Bologna	Living Lab activities, such as the campaigns, the citizen science workshops, were advertised and described on the local and national press (e.g., Il Resto del Carlino, Leggo, and Platinum, a monthly issue in partnership with Sole 24 Ore focusing on Italian enterprises and relevant entrepreneurs), as well as through regional broadcasts (regional newscast). This helped the Living Lab to engage more participants in its activities.	This activity helped to improve the visibility of the Living Lab and its expertise in various aspects of air quality and climate change at the local and national level.

Living Lab infrastructure and equipment

Activity	Description	Outcome
<p>What? Low-cost sensor deployment on the rooftop of the Department of Physics and Astronomy, UNIBO</p> <p>When? June-July 2019</p> <p>Where? UNIBO, Bologna</p>	<p>Engaging university students, Bologna Living Lab planned a new measurement campaign co-locating Citizens Kits and reference instrumentation on the rooftop of the Department of Physics and Astronomy, UNIBO, for a long time sampling in different weather conditions. This activity served as a starting point to develop new ideas and engaging activities for students, residents, as well as local stakeholders.</p>	<p>This experiment was planned such that it enables the team to not only demonstrate the potential of the low-cost sensors but also further research the limitations of these sensors. The results of this campaign will be used to plan future citizen science workshops.</p>

Fig. 15: Low-cost sensor deployment on the rooftop of the Department of Physics and Astronomy, UNIBO, June-July 2019, Bologna (Italy)



Living Lab stakeholder relationships

Activity	Description	Outcome
<p>What? Workshop with Living Lab stakeholders</p> <p>When? 11 June 2019</p> <p>Where? Department of Physics and Astronomy, UNIBO</p>	<p>In June 2019, Bologna Living Lab organized a workshop with local stakeholders, including the Emilia-Romagna region and the local environmental protection agency, ARPAE, to discuss the results obtained during the iSCAPE project. These included the behavioural change framework and simulations conducted to assess the traffic management policies.</p>	<p>During the workshop, the Living Lab stakeholders identified some issues that need to be solved before the simulations can be directly exploited. Despite these issues, they found the results to be very convincing. The stakeholders were delighted to learn more about the simulation set-up and eager to explore their potential to test other traffic management policies. During the workshop, it was also agreed that other project results related to green infrastructure or photocatalytic coating will be presented in a follow-up workshop to be organized next fall. Direct meetings and contact with the key stakeholders help to strengthen the established relationship and enables the Living Lab to discuss future collaboration opportunities in addition to identifying new application areas for the project results.</p>

Fig. 16: Workshop with local stakeholders organized by Bologna Living Lab, 11 June 2019, Bologna (Italy)



Living Lab stakeholder relationships

Activity	Description	Outcome
<p>What? Planning and organization of a follow-up workshop with Living Lab stakeholders</p> <p>When? June - October 2019</p> <p>Where? Department of Physics and Astronomy, UNIBO</p>	<p>Following the success of the first workshop in June 2019, it was decided to organize a follow-up workshop with local stakeholders, including the Emilia-Romagna region and the local environmental protection agency, ARPAE. Therefore, the planning and organization of the workshop were started in summer 2019. The upcoming workshop will focus on the results obtained during the iSCAPE project, especially regarding the studies on the effects of green infrastructure on urban air quality and urban thermal comfort.</p>	<p>This activity will enable the Living Lab to discuss future collaboration opportunities with the key local stakeholders in addition to identifying new application areas for the project results.</p>

New initiatives and synergies

Activity	Description	Outcome
<p>What? Synergies with the H2020 project OPERANDUM</p> <p>When? July 2018 - June 2022</p> <p>Where? Po Valley in Italy</p>	<p>UNIBO coordinates the OPERANDUM project (Open-air laboratories for nature-based solutions to manage environmental risks) in which the Living Lab approach is being extended to open air laboratories (OALs) for enhanced exploitation of nature-based solutions in natural and rural areas. In this project, UNIBO works with other research institutes, local stakeholders and citizens to develop solutions to enhance the environmental and biological conditions of rivers and valleys in the Emilia-Romagna coastal areas. The synergies identified with the OPERANDUM project enable UNIBO to apply the communication skills and methodologies developed during the iSCAPE project to engage and establish close relationships with local stakeholders and citizens not directly involved in the project, but essential to its success.</p>	<p>The skills and knowledge acquired by the Living Lab during the iSCAPE project provide great opportunities for the team to apply their lessons learned to other projects and new initiatives, as well as use the Living Labs as an instrument to tackle environmental challenges.</p>
<p>What? Participation in a LIFE project proposal</p> <p>When? June 2019</p> <p>Where? UNIBO</p>	<p>In June 2019, Bologna Living Lab participated in a new project proposal prepared within the framework of the LIFE programme. The collaboration was born through the participation at the above mentioned launch conference event of the Veg-Gap project. The project proposal was related to urban green infrastructure and its effects on air quality. The Living Lab participated in this consortium with its long-term expertise in air pollution and fluid-dynamics. In addition, it enabled the team to further exploit a set of the results obtained during the iSCAPE project.</p>	<p>The proposal fulfils the objective of integrating and extending the results obtained during the iSCAPE project to new applications on similar themes. In addition, the network of collaborators was further extended by taking part in a new partnership. If accepted, this project will bring additional resources to the team.</p>

Bottrop Living Lab



“Accompanying the Living Lab since its creation, the further development of the Wandering Trees activities and the growth of the Living Lab network so far has been very instructive and exciting. The Living Lab has brought together a large number of different stakeholder groups in urban society who did not necessarily interact before. This is a prime example of a transdisciplinary perspective on air quality management. Bottrop Living Lab has built a new network that allows it to continue its activities beyond the original initiative, driven by joyful tasks and directly tangible successes.”

Stefan Greiving, Head of IRPUD, TUDO

Dissemination Activities

Activity	Description	Outcome
What? Release of interviews and articles on local and national press, broadcast and newspapers When? Continuously Where? Bottrop	The activities of Bottrop Living Lab are widely available and communicated in media. This includes web presence (e.g. community-based website Wir lieben Bottrop ; social media Facebook group @WanderbaumBottrop), a positive coverage in the print media at local, regional, and national scope (e.g. reporting in daily newspapers; regional newspaper “Der Westen”; online journal “Focus”), as well as regional broadcasts (reporting in West German Broadcasting [WDR]).	Communication and presence in media attract attention for Bottrop Living Lab activities and improve its visibility. The coverage in the media was helpful for the acquisition of participating citizens and to increase the group of collaborators. The articles, interviews, and broadcasts have also raised public awareness of climate change topics and disseminated knowledge.

Dissemination Activities

Activity	Description	Outcome
What? Participation and networking at the Resilient Cities Conference 2019 When? 26-28 June 2019 Where? Bonn, Germany	In June 2019, Bottrop Living Lab participated in the Resilient Cities Congress (“Resilient Cities 2019 - The 10th Global Forum on Urban Resilience and Adaptation”) which is a leading platform for urban resilience and climate adaptation. The event was attended by both a project researched and a city representative who has been actively involved in the Living Lab activities. During this event, the iSCAPE project and its achievements were presented and discussed with researchers, administrative, and civil society stakeholders focussing on urban resilience.	Conferences and congresses are understood as an opportunity to get in touch with a scientific community and discuss the activities of Bottrop Living Lab with a broad range of stakeholders, including decision and policy makers. Participation in the Resilient Cities Conference not only increased the visibility of the Living Labs efforts, but also helped to gather new ideas and insights on how to generalize and extend the results obtained during the project to other application areas and cities.
What? Preparation for the Open Living Lab Days 2019 (forthcoming) When? July-August 2019 Where? TUDO	In summer 2019, the team dedicated efforts to planning of its participation in the Open Living Lab Days (OLLDs) to be held in Greece on 3-5 September 2019. OLLDs enables the Living Lab community to exchange knowledge and lessons learned. Next year, Bottrop Living Lab is planning to apply for an official Living Lab status following the ENoLL Adherent Membership process and, therefore, this event is a great opportunity for the Living Lab team to learn from experienced Living Labs within the ENoLL network.	The participation at the conference will enable the team to network and exchange knowledge with the Living Lab community. The lessons learned of other Living Labs attending the Open Living Lab Days will contribute to the further development of the Bottrop Living Lab.

Dissemination Activities

Activity	Description	Outcome
What? Preparation for the Dortmund Conference on Spatial Planning and Planning Research 2020 When? Summer 2019 Where? Dortmund	A member of the Bottrop Living Lab will be part of a conference session to be held during the Dortmund Conference on Spatial Planning Research 2020 on 17-18 February 2020. This session will focus on Living Labs, especially co-creation methodologies and evaluation. In this session, Bottrop Living Lab will present its activities and efforts dedicated to creating a self-sustaining Living Lab structure.	The participation at the conference will enable the team to network and exchange knowledge with other practitioners. The lessons learned of other Living Labs attending the session and the interactive discussion with all other participants will contribute to the further development of Bottrop Living Lab.

Living Lab infrastructure and equipment

Activity	Description	Outcome
What? Continuous deployment of low-cost sensors and facilitation of citizen science activities When? Continuously Where? Bottrop	The low-cost sensors distributed during the Citizen Science Workshops held in December 2018 are still in use by local residents. Since the workshops, the participants have been actively exploring their own research questions and have been collecting new data to assess their exposure to air pollution. Data collected by citizens are continuously uploaded to the Smart Citizen platform. The measurement campaign has been sustained by the Living Lab to actively engage with local residents and form a citizen science community.	The low-cost sensors function as a tool to increase the awareness of urban pollutants and actively involve residents in air pollution monitoring. Through these activities, a database on Bottrop's prevailing air quality situation is being generated. Local knowledge and collected air pollution data can be further utilized in team's research activities.

Citizen engagement and co-creation

Activity	Description	Outcome
<p>What? Co-creation workshop with representatives of three local primary schools to design the new Wandering Trees Parade in 2019</p> <p>When? 27 March 2019</p> <p>Where? Project room “Zukunftsstadt”, Bottrop</p>	<p>The Bottrop Living Lab management team invited representatives of local primary schools to jointly collect new ideas for the upcoming Wandering Trees Parade 2019. These included new locations for the parade, as well as entertaining activities. The event was attended by three representatives of three primary schools, which was a suitable group size for this workshop. The workshop participants had plenty of time to discuss their ideas and ask questions.</p>	<p>It is through planning of the Wandering Trees Parade 2019 and co-creation workshop with students, that the team was able to engage a new stakeholder group, school children, in their Living Lab activities. As a result, this helped the Living Lab to further increase awareness of air pollution and the importance of green in the city. The emphasis on the importance of air quality and the jointly developed concept with playful activities for the children ensured that all participants confirmed their interest in the new Wandering Trees Parade.</p>

Fig. 17: Creating a tree at the Albert Schweitzer Primary School organized by Bottrop Living Lab, 6 May 2019, Bottrop (Germany)



Citizen engagement and co-creation

Activity	Description	Outcome
<p>What? Co-creation activities with students around the Wandering Trees</p> <p>When? 6 May 2019</p> <p>Where? Albert Schweitzer Primary School, Bottrop</p>	<p>During the Living Lab lesson at the Albert Schweitzer Primary School, the students learned a lot about trees and their importance for human health. They participated in a short quiz that the team designed specifically for this target group. Afterwards, the students were asked where trees could wander in their schoolyard through a playful interaction. First, an aerial photograph was used, on which the students pinned small trees, and then, a site visit was carried out, in which selected locations were marked with a chalk spray on the ground.</p>	<p>The event was designed such that it helped the students to prepare for the upcoming Wandering Trees activity in their schoolyard scheduled two weeks later. This led to the increased excitement and willingness to participate in the activities. Children also learned how to take care of the trees. Such activities not only help to increase awareness of air pollution topics, but also help the team to continuously improve and plan new activities around the Wandering Trees.</p>
<p>What? Beginning of the Wandering Trees Parade 2019</p> <p>When? 18 May 2019</p> <p>Where? From “Mitmachfest” Berliner Platz, Bottrop to Albert Schweitzer Primary School, Bottrop</p>	<p>The beginning of the parade, when the trees wandered to the first participating primary school, was linked to a city festival. At the “Mitmachfest” (city festival), the Bottrop Living Lab set up an information booth where all interested citizens could learn more about the iSCAPE project and the Wandering Trees. For this booth, Bottrop Living Lab prepared various promotional materials, including leaflets, roll-ups, postcards, and stickers. In addition, the Bottrop Living Lab team made tree decorations and seed balls together with children. After the festival, the trees moved to the Albert Schweitzer Primary School with the help of the students and their parents.</p>	<p>The event increased the visibility of the Living Lab activities and enabled the team to share information about the iSCAPE project and their work to improve air quality and urban climate with residents of Bottrop. The offered activities for children (i.e. tree decorations, seed balls) enabled the team to share this information in a playful way.</p>

Citizen engagement and co-creation

Activity

Description

Outcome

What?

Co-creation activities with students around the Wandering Trees

When?

3 June 2019

Where?

Cyriakus School, Bottrop

The concept of this event was based on the experience and feedback of the previous event of 6 May 2019. This time, Bottrop Living Lab organised an interactive session in the Cyriakus School. Similarly to the activity in Albert Schweitzer Primary School, students learned about the importance of trees and green infrastructure in a playful way. They also selected possible locations for the upcoming Wandering Trees in their schoolyard. For this purpose, an aerial photograph of the schoolyard was used again. The students marked potential locations on the photograph first and then inspected them in the schoolyard and marked the locations with chalk spray in real life.

Similarly to the event on 6 May 2019, the co-creation activities enabled the students to prepare for the upcoming Wandering Trees activity in their schoolyard scheduled two weeks later. During this event, children also learned how to take care of the trees. Such activities not only help to increase awareness of air pollution topics, but also help the team to continuously improve and plan new activities around the Wandering Trees.

Fig. 18: Setting the position of the Wandering Trees at the Cyriakus School organized by Bottrop Living Lab, 3 June 2019, Bottrop (Germany)



Fig. 19: Presenting students of Albert Schweitzer Primary School with a certificate organized by Bottrop Living Lab, 3 June 2019, Bottrop (Germany)



Citizen engagement and co-creation

Activity	Description	Outcome
<p>What? Second move of the wandering trees with students</p> <p>When? 17 June 2019</p> <p>Where? From Albert Schweitzer Primary School, Bottrop to Cyriakus School, Bottrop</p>	<p>With the help of the students of the second school - the Cyriakus School in Bottrop - the Wandering Trees moved from the schoolyard of the Albert Schweitzer School to the schoolyard of Cyriakus School. The students of the first participating school received a certificate for their efforts (see Figure 20). Having arrived at the schoolyard of Cyriakus School, the trees were put in the designated places. Caretakers were assigned for each of the trees and watering cans were distributed to the students. The arrival of the trees was jointly celebrated.</p>	<p>Moving the trees together with 12 students and some volunteers sparked off enthusiasm amongst the participants and helped to create emotional bonds with the plants. The students learned about the importance and qualities of trees in a playful way. They were also familiarized with air pollution challenges and ways to contribute to solving this complex problem. The parade lead through the centre of Bottrop, and thus attracted a lot of attention from local residents which were eager to learn more about Living Lab activities. Overall, the activity contributed greatly to the visibility of the team's efforts.</p>

Living Lab stakeholder relationships

Activity	Description	Outcome
<p>What? Regular meetings with the City of Bottrop to prepare the Wandering Trees Parade 2019 and expand the collaborator network</p> <p>When? Spring-summer 2019</p> <p>Where? Dortmund</p>	<p>During spring and summer 2019, several meetings with representatives of the City of Bottrop were conducted. The meetings focused on the preparation of the Wandering Trees Parade 2019. Moreover, strategies on how to expand the Living Lab's collaborator network were discussed. Special attention was given to new target groups and synergies with other networks and local initiatives, for example, the ZUKUR Garden project ("Zukunft-Stadt-Region-Ruhr").</p>	<p>The meetings further strengthened cooperation with the City of Bottrop and enabled the Living Lab to discuss future collaboration opportunities.</p>

New initiatives and synergies

Activity	Description	Outcome
<p>What? Identification of synergies with other projects using the Living Lab approach (e.g. ZUKUR Project)</p> <p>When? Summer 2019</p> <p>Where? Dortmund, Bottrop</p>	<p>In addition to the iSCAPE project, both the IRPUD and the City of Bottrop are participating in several research projects using the Living Lab approach (e.g. ZUKUR). The ZUKUR project aims at increasing climate resilience and reducing socio-ecological inequalities. Recently, synergies between both projects were discussed and the opportunity to link “ZUKUR Garden” (planned in winter 2019) with the iSCAPE Wandering Trees was considered. Exchanging skills and knowledge in Living Labs and connecting activities provides a clear added value. Follow-up meetings with the City of Bottrop on other project partners will be held to leverage the identified synergies.</p>	<p>The identified connecting factor with other projects using the Living Lab approach allows the team to grow and provides opportunities to apply and exchange knowledge. Existing organizational structures and contacts can be used and Living Lab activities can be bundled to tackle environmental challenges. Furthermore, the field of application can be enhanced and the topic of green infrastructure will be strengthened.</p>

Living Lab organization

Activity	Description	Outcome
<p>What? Meetings to discuss shifting the management of Bottrop Living Lab to the department(s) of the City of Bottrop</p> <p>When? 25 July 2019</p> <p>Where? Bottrop</p>	<p>During the time of the report writing, the first meeting of a series of meetings with representatives of the City of Bottrop was scheduled. The main aim of these meetings is to discuss the shift of the management of Bottrop Living Lab to the department(s) of the City of Bottrop and plan the transformation process. Personal and financial resources will be discussed in addition to developing an action plan to establish the City of Bottrop as a host and organizational body of the Living Lab.</p>	<p>Shifting the management of Bottrop Living Lab to the City of Bottrop as a hosting organization will sustain the Living Lab activities beyond the iSCAPE project. Within the meetings, the organizational structure of the Living Lab will be modified and further development opportunities (e.g. new topics and additional Living Lab activities) will be detected.</p>

Dublin Living Lab



“From the very beginning of the project, we have been committed to sustaining the skills and knowledge developed during iSCAPE. Our Living Lab experience has opened up various opportunities to establish new collaborations with industry, city stakeholders, and other research organizations. The co-creation sessions with school children have been truly inspirational. Inspired by the children’s creativity, we were able to look at the challenges with a fresh pair of eyes and think outside the box. All of this has motivated us to continue our efforts, share the results we have achieved, and find new ways and opportunities to co-create and experiment for the years to come!”

Francesco Pilla, Associated Professor, UCD

Dissemination Activities

Activity	Description	Outcome
What? Panel discussion at FutureScope , Ireland’s number one innovation event When? 28 March 2019 Where? The Convention Centre Dublin, Ireland	Francesco Pilla, the Living Lab lead, along with representatives from Smart Dublin, Microsoft, DCU Alpha, and Enable Research TCD discussed the importance of collaboration when developing new urban solutions to today’s city challenges using smart technologies. Francesco shared Dublin Living Lab’s experiences with engaging citizens in the co-creation process and citizen science initiatives.	Participation in the panel discussion not only enabled the Living Lab to share its experiences, but also provided a great opportunity to discuss future direction of the regional innovation ecosystem and collaboration opportunities with the key local stakeholders, especially Smart Dublin. In addition, after the event, the team was approached by a community education center providing learning opportunities to local residents and expressed their interest in collaboration.

Fig. 20: Francesco Pilla, Dublin Living Lab lead, with the Smart Dublin team during the Future Scope, 28 March 2019, The Convention Centre Dublin (Ireland)



Dissemination Activities

Activity

Description

Outcome

What?

Preparation and successful submission of two workshop applications to the [OLLDs 2019](#)

When?

May 2019

Where?

UCD

In May 2019, Santa Stibe, the Living Lab manager, participated in the preparation of two workshop applications for the Open Living Lab Days (OLLDs) 2019 to be held in 3-5 September 2019 in Thessaloniki, Greece. These applications were written by the representatives of several organizations and included reflections on the previous expertise in Living Labs gained during the project implementation. Both of these applications were successfully submitted and included in the OLLD's agenda.

By participating in the OLLDs 2019 and facilitating two workshops, Santa will be able to share Dublin Living Lab's experiences in organizing various co-creation activities and citizen science workshops. Networking opportunities provided by the event will also enable the Living Lab to meet other practicing Living Labs to exchange lessons learned and discuss potential synergies and collaboration opportunities.

Dissemination Activities

Activity	Description	Outcome
<p>What? Preparation and submission of a successful application to the Science is Wonderful exhibition</p> <p>When? June 2019</p> <p>Where? UCD</p>	<p>In June 2019, an application to the Science is Wonderful exhibition to be held in 25-26 September in Brussels, Belgium was successfully prepared and submitted. During this event, Dublin Living Lab will participate in the iSCAPE project stand to share some project results to a great number of school children attending the event. The activities organized by the team are planned to be interactive and engaging.</p>	<p>This event will help to increase the visibility of Dublin Living Lab's activities internationally. By organizing interactive and engaging activities for the event participants, the team aims to share the project results and increase the general awareness of air pollution challenges and ways to co-create solutions.</p>
<p>What? Panel discussion at Velo-city 2019, the world's largest conference in the area of cycling</p> <p>When? 28 June 2019</p> <p>Where? The Convention Centre Dublin, Ireland</p>	<p>In June 2019, Francesco Pilla, the Living Lab lead, participated in a panel session organized as part of the world's largest conference in the area of cycling, Velo-city 2019. Francesco together with representatives from Smart Dublin, Google, See.sense, and BleeperBike discussed the opportunities of using smart technologies to tackle mobility challenges. Having heard the Living Lab's experience in using low-cost sensors to monitor different variables, including air pollution, the panelists debated the use of the project sensors to monitor the cyclist exposure to air pollution.</p>	<p>This event increased the visibility of the project outcomes and enabled the Living Lab to share its experience in using low-costs sensors and organizing citizen science activities to an international audience. This event also provided great networking opportunities and helped the team to identify synergies and collaboration possibilities with both multinational corporations, SMEs, and public authorities. Established connections can be further leveraged when developing new consortia and project proposals.</p>

Dissemination Activities

Activity	Description	Outcome
What? Production of a new book for school children When? June-August 2019 Where? Dublin, Ireland	In summer 2019, the Dublin Living Lab team dedicated significant efforts to producing a new book for school children (the working title of the book at the time of report writing was 'The Hero Inside You'). Having produced a book for school children last year ('The Air We Breathe'), which introduces the topic of air pollution, the team decided to produce a follow-up book. This book was designed as a comic, describing the adventures of super kids fighting air pollution monsters. The book tells several stories, which were created based on the original ideas produced by children during the Play and Learn workshop series. These activities were organized by the Living Lab in local schools over the past years. The character dialogues also includes the original quotes from the workshop participants.	The produced books will be distributed locally and internationally with the aim to encourage young children to be creative and participate in solving air pollution challenges, as well as to increase the visibility of the team's efforts. The Living Lab team has observed that such activities that are fun and entertaining, while serving a great cause increase the willingness of young citizens to participate in co-creation activities. The team has also observed that it is important to provide feedback and share results which were created based on the workshop outcomes with their participants. This helps children to see how their ideas have helped the Living Lab team to increase the awareness of air pollution challenges.

Living Lab infrastructure and equipment

Activity	Description	Outcome
<p>What? Planning of the utilization of the Living Lab's equipment and infrastructure as part of a new EU project WeCount</p> <p>When? Spring 2019</p> <p>Where? Dublin, Ireland</p>	<p>In spring 2019, the Living Lab dedicated significant efforts to developing a new partnership and planning of further utilization of the Living Lab's infrastructure and equipment, including the project sensors. At the time of the report writing, the team received confirmation that the submitted project proposal was accepted and the project funding will be granted to implement a two-year project within the framework of the H2020 programme.</p>	<p>This new project will enable the team to further expand their expertise in air pollution monitoring, along with skills and knowledge in citizen engagement and citizen science with an aim to empower citizens to take a leading role in the production of data, evidence, and knowledge around mobility in their own neighborhoods, and at street level. This project will also help to further strengthen the relationships with the Dublin City Council and Smart Dublin initiative, given that Dublin is among one of the five pilot cities.</p>
<p>What? Production of a standardized methodology and tools for co-creation</p> <p>When? June-August 2019</p> <p>Where? UCD, Ireland</p>	<p>To further enhance the Living Lab's infrastructure, the team dedicated significant efforts to standardize their approach to engagement activities using Lego bricks in summer 2019. Following the co-creation session organized during the ECO-UNESCO's Young Environmentalist Awards (23 May 2019, Dublin), the team was approached by Red Cross, interested in collaboration with the Living Lab to replicate the engagement method in schools across Eurasia. Therefore, to facilitate international uptake of the Living Lab's approach to citizen engagement, standardized methodology and tools were developed.</p>	<p>Standardization and harmonization of the Living Lab's working approach facilitate the replication and uptake of the Living Lab's method and tools both locally and internationally. This significantly increases the scale and reach of the Living Lab activities. Visibility and international recognition also enables the team to find new collaboration partners and funding sources to sustain its activities and projects.</p>

Citizen engagement and co-creation

Activity	Description	Outcome
<p>What? Co-creation activity with children during the ECO-UNESCO's Young Environmentalist Awards</p> <p>When? 23 May 2019</p> <p>Where? The Convention Centre Dublin, Ireland</p>	<p>The event participants were invited to participate in an interactive session aimed at generating new ideas and solutions to air pollution challenges using Lego bricks. This activity was based on Living Lab's previous experience in running co-creation workshops with school children, which are both fun and educational. The event was attended by nearly 1000 young environmentalists and focused on increasing awareness and knowledge of the environment among young people.</p>	<p>Organizing new co-creation activities helps to build on the momentum and increase citizen engagement in solving complex urban challenges. It also helps the Living Lab to refine and improve the tools and methods used for ideation and prototyping. After the event, the Living Lab lead was approached by a large international NGO interested in adapting the Living Lab's approach to working with children using Lego. They inquired if the Living Lab team would be available to train their educators so that this method can be replicated in schools across Eurasia.</p>

Fig. 21: Co-creation activity organized during the ECO-UNESCO's Young Environmentalist Awards, 23 May 2019, The Convention Centre Dublin (Ireland)



Citizen engagement and co-creation

Activity	Description	Outcome
What? Play and Learn session at the UCD Festival When? 6 June 2019 Where? UCD, Dublin	Similarly to the first time when the Living Lab team participated in the UCD Festival in 2017, the session participants were engaged into a playful discussion about air pollution and ways to control it. Children were encouraged to build their solutions to air pollution using Lego bricks. During the session, children came up with various ideas, including a machine with solar-powered batteries and wings that sweep away air pollution, or a wall equipped with filtering windows that can retain oxygen and keep out pollution.	Interactive and fun activities increase the interest and willingness of children to be engaged in co-creation. With each new activity, the team members are also improving their facilitation skills and the approach to running the 'Play and Learn' workshops. These workshops facilitate the children's curiosity and creative thinking.

Fig. 22: Children building their solutions to air pollution during the UCD Festival, 6 June 2019, Dublin (Ireland)



Living Lab stakeholder relationships

Activity	Description	Outcome
<p>What? Regular meetings with the Smart Dublin initiative</p> <p>When? Spring - summer 2019</p> <p>Where? Dublin, Ireland</p>	<p>Smart Dublin is one of the key stakeholders and collaboration partners of the Living Lab. To maintain and enhance the established working relationships, both face-to-face and online meetings were held on a bi-monthly basis during the spring and summer of 2019. During these meetings, project ideas and new collaboration opportunities were discussed.</p>	<p>Regular contact and communication with Smart Dublin have not only improved the working relationships but have also increased the city's willingness to pilot other large-scale deployments. In addition, the collaboration with Smart Dublin has increased the visibility of Living Lab's activities at both regional and national levels while opening up new collaboration opportunities with local companies.</p>
<p>What? A meeting with a Principal Environmental Health Officer, Dublin City Council</p> <p>When? 27 May 2019</p> <p>Where? Dublin City Council, Ireland</p>	<p>In May 2019, the Living Lab lead met with a Principal Environment Health Officer at the Dublin City Council to discuss the project results and impacts that research activities conducted by the Living Lab team could produce in terms of policy change. This discussion revealed some valuable insights and deepened the current understanding of the city's priorities and current challenges with regard to air pollution and climate change mitigation.</p>	<p>The meeting increased the city stakeholder's interest in the Living Lab's project work and research results, especially, the applicability and performance of PCS such as green infrastructure and low boundary walls to reduce pedestrian exposure to air pollution. It also enabled the team to gain a better understanding of a local policy-making process.</p>

New initiatives and synergies

Activity	Description	Outcome
<p>What? Several meetings to discuss collaboration opportunities with local companies</p> <p>When? July 2019</p> <p>Where? Online meetings</p>	<p>In July 2019, several meetings with local stakeholders were held to discuss potential collaboration opportunities. It is through established working relationships with the Smart Dublin initiative that the Dublin Living Lab was invited to discuss potential collaboration with Dublin Bus (a bus operator providing services in Dublin) and GoCar (a car sharing company). During these meetings, the development of a network of air quality sensors to be installed on bus or car fleets were discussed. In addition, a meeting with An Post (the state-owned provider of postal services) was held to discuss the electrification of the van delivery fleet to reduce emissions. A follow-up meeting will be held to finalize the extent of the proposed pilot in Dublin.</p>	<p>Following the initial meetings, it was decided to further explore the collaboration opportunities and identify funding sources for a deployment project. Direct meetings with prospective collaborators enable the Living Lab to share their scientific expertise in air pollution monitoring, as well as experience in large-scale deployments. In addition, new collaboration projects enable the team to continue and expand their operations in the area of air pollution monitoring.</p>
<p>What? Synergies with other European projects</p> <p>When? Spring-summer 2019</p> <p>Where? Dublin, Ireland</p>	<p>In addition to the iSCAPE project, the team is participating in several European projects (e.g OPERANDUM, Connecting Nature). The skills and knowledge in Living Labs developed as part of iSCAPE, especially stakeholder management and citizen engagement, are of great support to the implementation of these projects. The iSCAPE's experience can be directly applied to piloting of nature-based solutions in Dublin.</p>	<p>The identified synergies with other European projects enable the team to not only sustain the skills and knowledge in Living Labs, but also enhance the field of application of these skills, thus, facilitating the growth and further development of the team.</p>

Living Lab organization

Activity	Description	Outcome
<p>What? Several internal meetings to discuss the integration of the Dublin Living Lab into the Spatial Dynamics Lab</p> <p>When? Summer 2019</p> <p>Where? UCD, Dublin</p>	<p>During summer 2019, several internal meetings were held to discuss the integration of the Dublin Living Lab activities into the scope and operations of the Spatial Dynamics Lab, co-directed by the Living Lab lead Francesco Pilla. These internal discussions were focused on the identity of the Living Lab after the completion of the project in addition to the Living Lab's organizational structure and governance.</p>	<p>The Spatial Dynamics Lab as a hosting and managing organization of the Living Lab would provide the Living Lab team with administrative support given that the Spatial Dynamics Lab is an established entity within UCD. Being part of a larger research center would also provide the team with additional resources in terms of facilities, staff and infrastructure.</p>

Guildford Living Lab



“Many millions of people across the world live in urban areas where the pollution levels are the highest. The best way to tackle pollution is to control it at the source. However, reducing exposure to traffic emissions in near-road environments has a big part to play in improving health and well-being for city-dwellers. The iSCAPE project provided us with an opportunity to assess the effectiveness of passive control measures such as green infrastructure that is placed between the source and receptors.”

Prashant Kumar, Professor and the founding Director of the GCARE, UoS

Dissemination Activities

Activity	Description	Outcome
<p>What? Presentation at the workshop organized by FCC</p> <p>When? 26 June 2019</p> <p>Where? Milton Keynes at the Connected Places Catapult, UK</p>	<p>In June 2019, the members of the Living Lab participated in a workshop organized by FCC.</p> <p>The event focused on air quality monitoring and modelling in the urban environment. During this event, the Guildford Living Lab team presented and discussed their experiences gained during the iSCAPE project, as well as other projects in the context of the workshop. More specifically, the presentation provided an overview of urban field monitoring and iSCAPE sensor testing.</p>	<p>During the event, the team had the opportunity to network with fellow researchers, delegates from the government (Department for Transport, Highways England Department for Environment, Food & Rural Affairs), local authorities, and SMEs. The event was also a great opportunity to increase the visibility of the team's efforts and research conducted in collaboration with local stakeholders and citizens. The visibility and recognition of the Living Lab's work is of significant importance when seeking new project funding and collaboration opportunities.</p>

Dissemination Activities

Activity	Description	Outcome
What? Presentation at the Eco-Schools Summits When? 10 July 2019 Where? Woking, UK	On June 10, Guildford Living Lab participated in Eco-Schools Summit organized by Surrey County Council (Travel team) for Surrey Sustainable Schools. During the event, the team members delivered a presentation which introduced air pollution challenges and provided an overview of the mitigation strategies by focusing on the benefits of the green infrastructure researched in the iSCAPE project. The presentation was followed by a question and answer session. Overall, the audience responded very positively to a number of ideas and suggestions proposed by the team and expressed their interest by asking various questions and providing enthusiastic responses.	The presentation increased the awareness of air pollution in the local community and the need for maintaining and implementing green infrastructure. It was evident that the ideas proposed by the Living Lab team were widely accepted among the audience and encouraged them to maintain a sustainable and green environment in their local community to keep the air clean.
What? Preparation of journal (3) and conference (2) papers from the Living Lab activities to disseminate the research outcomes When? July-October 2019 Where? Guildford, UK	During summer 2019, the Guildford Living Lab team dedicated significant efforts to preparing scientific publications (5) based on the iSCAPE project results related to the air pollution mitigation using green infrastructure.	Presenting the results in journal papers and conference proceedings helps to improve the visibility of the Living Lab. Harmonized and generalized findings also help to exploit the research outcomes for further applications, and create a room for further collaborations.

Living Lab infrastructure and equipment

Activity

What?

Development of the Sensor Toolbox

When?

Spring-summer 2019

Where?

Guildford, UK

Description

The use of low-cost sensors for environmental monitoring has led to a significant increase in the data volume and availability, which has made data processing and its analysis a challenging task. Therefore, to address this challenge, the team has been developing an easy-to-use [Sensor Toolbox](#) for data analysis and processing. Sensor Toolbox is a dashboard hosted on R Shiny platform and enables researchers, as well as people from non-technical background, to analyse and visualise data in an easy way. The tool supports several functions and like data summary, plotting, outlier detection and gap filling. Further information regarding the tool is available [online](#).

Outcome

The current version of the toolbox provides an easy way of analyzing data. There are several algorithms developed to detect outliers and fill data gaps, yet, there are ways in which the team is planning to improve this version. In the future, the team would be extending the framework to having a much interactive visualization with plotting options like box plot and correlation plots and also including more features for an in-depth statistical analysis of the data. The Sensor Toolbox is a great addition to the Living Lab's infrastructure and it will be utilized in the future projects focusing on environmental monitoring.

Fig. 23: Living Lab station deployment at the Sutherland Park, 18 June 2019, Guildford (UK)



Living Lab infrastructure and equipment

Activity	Description	Outcome
<p>What? Air quality measurement campaign using low-cost sensors</p> <p>When? March 2019 onwards</p> <p>Where? Stoke Road and Sutherland, Guildford, UK</p>	<p>Guildford Living Lab in close cooperation with GBC has recently deployed two Living Lab station units at the outskirts of Stoke Park (from March) and another two at Sutherland Park (from June), Guildford. The two sensors measure the chemical species carbon monoxide (CO), Nitrogen Dioxide (NO₂), and Ozone (O₃) plus atmospheric particles of different sizes (PM1, PM2.5 and PM10). This work was planned as a follow-up activity after the previous field campaign to further utilize the Living Lab's equipment by collecting long-term simultaneous measurements inside and outside the park via sensor technology. The data are measured every minute to gain high spatial resolution in the measurements. The air quality monitors are what is called "low-cost" sensors, and thus does not constitute regulatory grade instruments. The sensors will remain to measure the seasonal variation. The measurements from the sensors can be accessed here for the station outside the park, and here for the station inside the park. In case of sutherland park, the two stations are accessible here and here.</p>	<p>The research is targeted at measuring the influence of the hedge on the air pollution concentration in the vicinity of Stoke Road. The field campaign also helps to further assess the performance of the low-cost sensors and ultimately, identify future research opportunities and application areas to utilize the technology.</p>

Living Lab infrastructure and equipment

Activity	Description	Outcome
<p>What? Air quality measurement campaign for sensor validation</p> <p>When? May 2019</p> <p>Where? Stoke Road, Guildford, UK</p>	<p>During a week in May 2019, the researchers from the Guildford Living Lab ran an intensive air quality measurement campaign at Stoke Road in Guildford. The campaign took place from Monday to Thursday during daytime and involved a range of air quality instruments including Citizen Kits and reference equipment. During the campaign, nitrogen oxides (NO_x) and particulate matter (PM) were measured to assess the impact of green infrastructure in addition to validating the sensor performance.</p>	<p>The aim of this co-location study was to supplement the ongoing low-cost sensor measurements with a number of high-end instruments to be able to validate the performance of the project sensors. The result analysis is being carried out and will be published in a few months.</p>
<p>What? Planning of a low-cost sensor deployment campaign at Burpham</p> <p>When? July-August 2019</p> <p>Where? Burpham, Guildford, UK</p>	<p>After the air pollution workshop and co-creation activities conducted in collaboration with the Burpham Community Association on January 12, 2019, Guildford Living Lab was approached by the association with an inquiry to conduct on-site sampling. The community association expressed their interest in obtaining air pollution measurements using the low-cost sensors in some specific sites at Burpham. At the time of the report writing, the Guildford Living Lab team was actively planning the measurement campaign to be held by autumn 2019.</p>	<p>As a result of the team's efforts, the Burpham community is very aware of the importance of air quality. They are also very keen to participate in further citizen science activities using low-cost sensors to monitor the quality of air in the areas they live and work. Such sampling at a local scale enables the team to collect useful data and directly engage citizens in air pollution monitoring to influence policy changes.</p>

Living Lab infrastructure and equipment

Activity	Description	Outcome
What? Planning of a low-cost sensor deployment in a school at Merrow When? July-Sep 2019 Where? Merrow, Guildford, UK	Having conducted a successful workshop at Merrow Residential Association in June 2019, the Guildford Living Lab was approached by the Merrow association with an interest of deploying low-cost sensors in and around a local school. Therefore, in summer 2019, the team dedicated efforts to planning of a new campaign with an aim to understand the impact of ambient pollution level on indoor air quality.	By utilizing the Living Lab infrastructure and using the project sensors, the team can further engage students, parents, and the school administration in air pollution monitoring. The results of this activity would be beneficial for students, school administration, Merrow Residential Association, and policymakers to make informed decisions on mitigation solutions close to schools or similar places. Additionally, the deployment of a number of low-cost sensors at different places inside and outside of the school will enable the to further assess the potential and weaknesses of the low-cost sensors.

Citizen engagement and co-creation

Activity	Description	Outcome
<p>What? Co-creation activity at Merrow</p> <p>When? 09 June 2019</p> <p>Where? St John's Centre, Merrow, Guildford, UK</p>	<p>In June 2019, the Living Lab organized the air pollution workshop in collaboration with one of the residential associations in Guildford (Merrow region). This workshop was focused on discussing air pollution control using green infrastructure solutions. After Prof. Kumar's talk, as a co-creation activity, the participants were divided into different groups to explore potential green infrastructure solutions in their residential area through a participatory mapping approach. The session concluded by the participants circulating from group to group to learn about what the other groups had suggested. This enjoyable and educational workshop was based on previous experience in running the co-creation activity with Burpham community, Guildford. The interactive display system was also used along with folders, flyers, and post-cards from the iSCAPE project.</p>	<p>Organizing co-creation activities helps to directly be in touch with the public and increases citizen engagement in solving air pollution challenges. In addition, it helped the Living Lab to collect feedback about the ongoing activities, which contributed to refining and improving the methodology to be used for future Living Lab activities. After the event, the Living Lab's team was approached by the residents to take further steps to move the air quality agenda forward within both the local community and more widely across Guildford and beyond. The Merrow residential association inquired if the Living Lab team would be available to do some measurements in air pollution hotspots across the area.</p>

Fig. 24: Air pollution workshop organized as part of the EU Green Week, 9 June 2019, Guildford (UK)



Living Lab stakeholder relationships

Activity	Description	Outcome
<p>What? HedgeDATE workshop</p> <p>When? 16 July 2019</p> <p>Where? Lecture Theatre J, Stag Hill, Guildford, GU2 7XH</p>	<p>In July 2019, the team organized a HedgeDATE (Hedge Design for the Abatement of Traffic Emissions) workshop with local stakeholders to discuss the effective hedge design for the abatement of traffic emissions. In addition, the workshop participants discussed the HedgeDate tool, which provides recommendations based on input data provided by users. The workshop participants were from a variety of backgrounds, including public, private, and academia. The HedgeDATE tool is supported by the University of Surrey's Urban Living Award.</p>	<p>The workshop enabled the team to not only share the aggregate findings from ongoing and previous research on the relationship between green infrastructure, air quality, and human exposure to the participants, but also helped to strengthen the relationships with key local stakeholders. In addition, workshop discussions helped the team to construct a long term product development plan, which (a) includes Guildford Living Lab as a pilot study area to develop the HedgeDATE prototype and seek feedback, and (b) enhances the applicability of the tool by targeting potential beneficiaries in other communities.</p>

Fig. 25: HedgeDATE workshop, supported by the University of Surrey's Urban Living Award, organized as part of the Guildford Living Lab activity, 16 July 2019, Guildford (UK)



New initiatives and synergies

Activity	Description	Outcome
<p>What? Participation in the OPERANDUM project</p> <p>When? July 2018 - June 2022</p> <p>Where? Guildford, UK</p>	<p>Open-air laboratories for nature-based solutions (NBS) to manage environmental risks (OPERANDUM) aims to reduce hydro-meteorological risks in European territories through co-designed, co-developed, deployed, tested and demonstrated innovative green and blue/grey/hybrid nature-based solutions and push business exploitation. UoS, as a partner in the project, aims to implement Guildford Living Lab experiences (e.g., public awareness, citizen engagement, cooperation with local stakeholders) from the iSCAPE project into the activities related to the OPERANDUM project.</p>	<p>Employment of NBS for the mitigation of hydro-meteorological phenomena in European territories is not adequately established, which can be addressed by applying skills and expertise gained during the iSCAPE project to the OPERANDUM project. Synergies with other European projects, enables the team to sustain and further develop their skills and experience in Living Labs.</p>
<p>What? Synergies with CARe-Cities: Clean Air Engineering for Cities</p> <p>When? January 2019 until July 2020, recently extended for an additional year</p> <p>Where? Guildford, UK</p>	<p>With a collaborative vision of 'clean air for all', CARe-Cities aims to establish a multidisciplinary team for understanding emissions, penetrating low-cost pollution monitoring technology and exposure reduction strategies in selected cities. Being a partner in this project, UoS with the help of Guildford Living Lab applies the iSCAPE experiences to pre-assess the pollution monitoring devices before sending them abroad. Additionally, UoS and its partners assess the commuters' exposure by collecting primary concentration data and evaluating different control scenarios to propose optimal transport emission control programs to reduce the impact on human health.</p>	<p>CARe-Cities aspires to bring cleaner air to cities by building a knowledge exchange platform. Its activities include joint workshops, researchers exchange and pilot studies to address urban development and health impact assessment agendas in selected countries. The synergies between CARe-Cities and iSCAPE enables Guildford Living Lab to apply its skills and lessons learned beyond the iSCAPE project. In addition, the CARe-Cities partners have expressed interest in consolidating the project findings to develop new research grant proposals, which provides great opportunities for obtaining new funding for Living Lab activities.</p>

New initiatives and synergies

Activity	Description	Outcome
What? A proposal submission When? By 20 August 2019 Where? Guildford, UK	<p>In summer 2019, the team dedicated significant efforts to prepare a new project proposal for a call funded through Engineering and Physical Sciences Research Council (EPSRC)'s Global Challenges Research Fund (GCRF) allocation, with support from the Physical Sciences Theme. The aim of this activity is to support an internationally leading programme of physical sciences research to tackle the challenges faced by developing countries.</p>	<p>The background and expertise of the research team in addition to experiences gained through Living Lab activities have enabled the team to prepare a solid project proposal. Moreover, if accepted, this project will provide additional resources to ensure the sustainability of the future activities of Guildford Living Lab.</p>

Living Lab organization

Activity	Description	Outcome
What? Activities for larger visions When? During and after iSCAPE project Where? Guildford, UK	<p>Since 2017, GCARE has been involved in many activities related to air quality. GCARE vision is to realise collaborative global vision of "clean air for all" by understanding the impact of air pollutants on life quality, developing internationally-validated engineering-driven solutions, and underpinning regulatory strategies. To achieve these goals, Guildford Living Lab works as a testbed for GCARE research activities.</p>	<p>Being part of GCARE activities allows access to field campaign sites and volunteers. It also provides co-creation opportunities and enables uptake of research to influence practice and policy change.</p>

Hasselt Living Lab



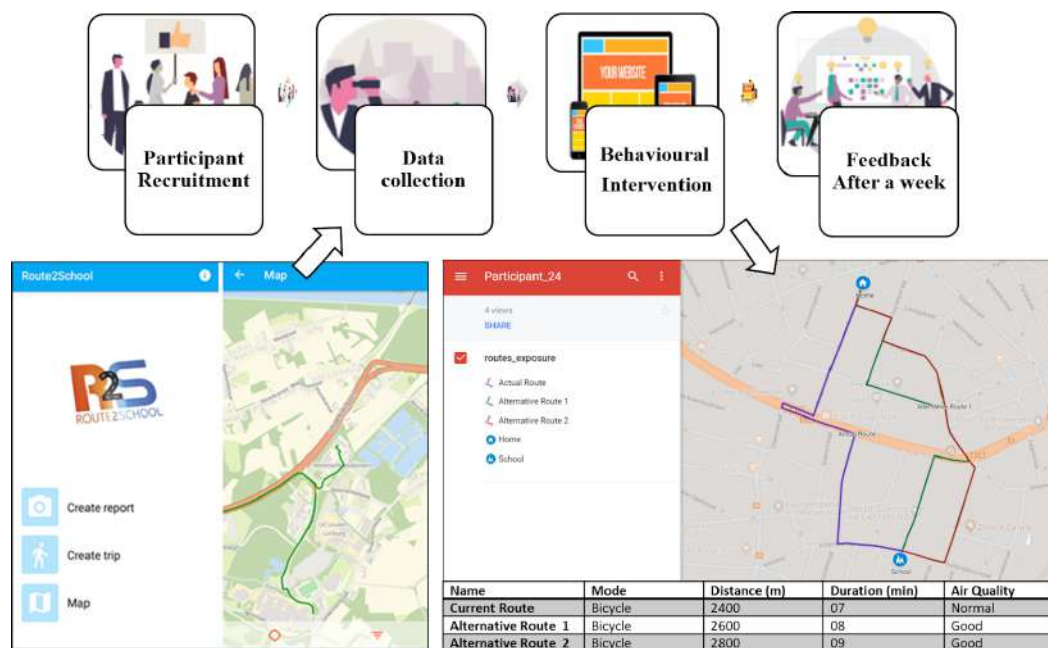
“Stad Hasselt (Municipality) is keen to improve mobility and air quality problems within the city. Hasselt Living Lab with the support of Stad Hasselt has showcased that smart and novel informational-based behavioural interventions have significant potential to encourage sustainable and environmentally friendly travel behaviour among citizens.”

Muhammad Adnan, Senior Researcher, Transportation Research Institute (IMOB), UH

Dissemination Activities

Activity	Description	Outcome
<p>What? Presentation at the 8th International Conference on Current and Future Trends of Information and Communication Technologies in Healthcare (ICTH 2018)</p> <p>When? 6 November 2018</p> <p>Where? Leuven, Belgium</p>	<p>Last year, the members of Hasselt Living Lab presented the framework and methodology (see Figure 26) of the study titled “Air Quality based informational intervention framework to promote healthy and active school travel” during the 8th International Conference on Current and Future Trends of Information and Communication Technologies in Healthcare. The presentation was followed by a question and answer session and enabled the team to share the outcomes of the Living Lab activities in further detail. The intervention developed based on this framework and methodology was implemented by the team in spring 2019.</p>	<p>Attending the conference resulted in connections with people working in similar areas and enabled the team to share outcomes of the Living Lab activities. The future collaboration opportunities were also discussed during this event.</p>

Fig. 26: School route information-based behavioural intervention study: Design and implementation



Dissemination Activities

Activity

Description

Outcome

What?

Presentation at the special session of the [10th International Conference on Ambient Systems, Network and Technologies \(ANT 2019\)](#)

When?

2 May 2019

Where?

Leuven, Belgium

In spring 2019, a member of Hasselt Living Lab attended a special session of the ANT 2019 conference to present the methodology for trajectory analysis - designed to find out congestion zones in cities. Data for this study was collected during the iSCAPE project using the smartphone application 'HTB' (Health for Travel Behaviour). This application was developed by the team during the course of the project. It is also used in another mobility-oriented EU H2020 project named 'Track & Know'.

The conference provided Living Lab with great networking opportunities with both researchers and practitioners from various backgrounds, including Big data, Mobility, and Information Technology. During the event, the team was also able to increase the visibility of their efforts especially the smartphone application and its usability for data collection.

Fig. 27: Presenting the results of the GPS-based trajectory analysis in a special session of the ANT 2019 Conference, 2 May 2019, Leuven (Belgium)



Dissemination Activities

Activity	Description	Outcome
<p>What? Preparation of two journal articles based on informational interventions results</p> <p>When? May-July 2019</p> <p>Where? Hasselt</p>	<p>In summer 2019, Hasselt Living Lab dedicated significant efforts to prepare two manuscripts of the journal publications to be submitted to the Special Issues of Sustainable Cities and Society and Science of the Total Environment. These publications summarize the key findings and results of behavioural intervention studies performed by the team so far. These behavioural interventions were designed such that they promote the environmentally-friendly travel choices among citizens.</p>	<p>Publishing the results of the activities performed in a reputed journals helps to spread the outcomes to the larger scientific audience. The increased visibility of the Living Lab activities and validation of the research results through the peer-review process also enhances the team's opportunities to find collaboration partners and obtain funding for future research activities.</p>

Dissemination Activities

Activity	Description	Outcome
What? Planning and organization of the 2nd iSCAPE Summer School When? Summer 2019 Where? Hasselt	Hasselt Living Lab in collaboration with other iSCAPE partners worked hard in summer 2019 to plan and organise the 2nd iSCAPE Summer School in Hasselt scheduled for 16-17 September 2019. The summer school aims to broaden awareness of air pollution and ways to control it. Through the interactive workshops and game environment during the 2-day summer school, participants will learn about the living lab approach, sensing technologies, and how to engage citizens and city stakeholders to solve various problems related to the environment.	A wide range of participants, including urban planning practitioners, researchers and students involved in environmental and air pollution management studies, as well as municipality representatives are invited to the summer school. It is expected that the event will increase the outreach of Hasselt Living Lab and enable the team to strengthen ongoing and develop future collaboration opportunities, including the prospective partnership with VITO to implement 'School route' intervention in a larger area of Belgium.

Living Lab infrastructure and equipment

Activity	Description	Outcome
What? Planning of the extension of the informational-based school route intervention to other regions When? July-August 2019 Where? UH	Having successfully conducted an information-based 'School route' intervention in March 2019 with positive feedback from the participants of Antwerp region, it was decided to extend the team's efforts to other areas of Belgium. In summer 2019, the team dedicated great efforts to planning of a new initiative to implement the 'School route' intervention in other urbanized regions of Belgium like Ghent and Brussels to help children to avoid the harmful impacts of air pollution while school commuting.	During the planning phase of this initiative, several internal meetings were held and contacts with city authorities and school officials were established. It is expected that a new large-scale deployment of the Living Lab's infrastructure and tools will help to enhance the collaborator network and strengthen the relationships with stakeholders at both regional and national levels.

Living Lab infrastructure and equipment

Activity	Description	Outcome
<p>What? Deployment of a living lab station at School in Kuringen, Hasselt</p> <p>When? June - September 2019</p> <p>Where? Joris van Oostenrijkstraat street, Kuringen school in Hasselt</p>	<p>During the last week of June, Hasselt Living Lab deployed an air quality monitoring station at the Joris van Oostenrijkstraat street near the Kuringen school in Hasselt. The intention of this campaign is to observe the air quality around the school during the summer holiday time and compare it to normal school days. Air quality has been continuously monitored from July and the measurements of carbon monoxide (CO), nitrogen dioxide (NO₂), and ozone (O₃) in addition to atmospheric particles of different sizes (PM1, PM2.5, and PM10) will be collected until September 2019.</p>	<p>This research activity provides the team with some insights about the local air quality and will potentially demonstrate the fluctuation of various pollutant concentrations at the school environment during different time periods. The results will be communicated to the local municipality, Stad Hasselt, for further action. It is also planned to discuss further opportunities to utilize the infrastructure and low-cost sensors.</p>

Fig. 28: Deployment of a Living Lab station near the local school to monitor air quality by Hasselt Living Lab, July - September 2019, Hasselt (Belgium)



Living Lab infrastructure and equipment

Activity	Description	Outcome
<p>What? Deployment of the HTB smart phone application to detect active mobility among cardiac patients</p> <p>When? June - November 2019</p> <p>Where? UH</p>	<p>Health for Travel Behaviour (HTB) smartphone app is a by-product of the team's Living Lab activities and was developed to encourage and promote physical activity and environmental-friendly travel behaviour. This application was developed utilizing the team's skills in app development which were further enhanced during the course of the iSCAPE project. This mobile application enriches the Living Lab's toolbox and provides opportunities for the team to conduct mobility-related research involving various target groups. This app was utilized in the behavioural intervention study conducted with citizens of Hasselt, Bologna and Guildford in year 2018. The application is now being used in a new study with cardiac patients, which started in June 2019. For the study purposes, the patients are asked to create their travel diary using the HTB app, which then serves as a source for personalized recommendations. This information is provided with the aim to help the participants reach the minimal level of physical activity required for healthy living. A similar approach for a behavioural intervention study was used during iSCAPE.</p>	<p>During the recruitment of cardiac patients, connections with officials and doctors from different local hospitals were made, which increases the network of Living Lab collaborators.</p>

Citizen engagement and co-creation

Activity	Description	Outcome
<p>What? Workshop with citizens/participants regarding the 'School route' intervention study</p> <p>When? 22 March 2019</p> <p>Where? Hasselt University, City Campus</p>	<p>In order to spread awareness and motivate the recruited participants for the 'School route' study (implemented in March 2019), an introductory workshop was conducted by the team in March 2019. During this workshop, the Living Lab team presented details of the intervention study and described the associated tasks. The demonstration of how to record the home to school routes using R2S application was also given. The workshop was attended by 17 parents/guardians (who are responsible to escort their children to school). The workshop was concluded by a question and answer session where all the questions and concerns of the participants were addressed.</p>	<p>This workshop helped greatly to implement the study without any problems as the participants were well informed about all the tasks expected from them. Face-to-face interactions like this also create a deeper bond between citizens and the researchers, and increases their willingness to participate in research activities.</p>

Living Lab stakeholder relationships

Activity	Description	Outcome
<p>What? Meeting with the Stad Hasselt, city municipality (Mobility and Environmental departments)</p> <p>When? 14 May 2019</p> <p>Where? Stad Hasselt, Hasselt</p>	<p>In May 2019, a meeting with the Stad Hasselt was held at the City Hall in Hasselt. During the meeting, the Living Lab provided the city officials with a comprehensive overview of all the iSCAPE activities performed by the team so far. A very productive discussion followed the presentation. As part of this discussion, various pro-environmental strategies were discussed. In addition, Stad Hasselt officials highlighted several of the strategies which they would like to further assess.</p>	<p>Hasselt city representatives were very keen to know more details of the simulations and other solutions deployed within the iSCAPE project. Therefore, the relevant iSCAPE deliverables were forwarded to the city stakeholders after the meeting. City authorities, especially the mobility department showed interest for further collaboration to examine a specific car-restriction policy with various scenarios.</p>

Living Lab stakeholder relationships

Activity	Description	Outcome
What? Regular communication with the Stad Hasselt representatives When? Spring-summer 2019 Where? Hasselt University, City Campus	During the spring and summer 2019, Living Lab has been regularly communicating with the Stad Hasselt representatives. As a result, for example, the Stad Hasselt accepted the invitation to attend 2nd iSCAPE Summer School hosted by the Living Lab and officials from both the mobility and environment department of Stad Hasselt will attend the summer school in September.	The frequent interaction with the Stad Hasselt has helped strengthen the relation and is beneficial in the long run.

New initiatives and synergies

Activity	Description	Outcome
What? Collaboration with the Hasselair project When? 27 May 2019 Where? University College Leuven Limburg (UCLL), Diepenbeek Campus	In May 2019, an initial meeting with the representatives of the Hasselair project was conducted at University College Leuven Limburg (UCLL). This meeting was held to discuss synergies and collaboration opportunities between the iSCAPE and Hasselair projects. During the meeting, an overview of the activities done so far was presented by both parties. In addition, future collaboration was discussed.	This type of collaboration and knowledge exchange are of great support to sustain Living Lab's activities. In addition, as a result of the established collaboration, a special session for this project was arranged in the 2nd Summer School in Hasselt. It is expected that new synergies and collaboration opportunities will emerge to further strengthen the ties between UCLL and Hasselt Living Lab.

New initiatives and synergies

Activity	Description	Outcome
What? Collaboration with VITO (data sharing) When? January 2019 Where? UH	To conduct the planned air quality based route-to-school intervention study in March 2019, the team was in need of pollutant concentration data. Therefore, the team reached out to Flanders Institute of Technological Research (VITO) with an inquiry for data. To discuss the study purpose and data needs of the team, an initial online meeting was held. The meeting was followed by several interactions where details of data sharing and exchange were discussed.	As a result of the successful collaboration between Hasselt Living Lab and VITO, the team obtained the desired pollutant concentration data to conduct the planned study.
What? Research proposal preparation and submission to the Qatar National Research Fund When? 31 March 2019 Where? UH	In March 2019, a joint research proposal to examine mobility interventions along with informational interventions in the city of Doha, Qatar was submitted. The proposal was prepared in collaboration with researchers from the Qatar University and submitted to the Qatar National Research Fund. The proposal objectives were well in line with the goals and objectives of Hasselt Living Lab.	The acceptance of the proposal will provide Hasselt Living Lab with additional funds and enable the team to further develop the lab and its services.

Living Lab organization

Activity	Description	Outcome
What? Internal IMOB strategic meeting When? 16 May 2019 Where? UH	During an internal strategic meeting of the research institute, the Living Lab approach and expertise developed during the course of the iSCAPE project was discussed in addition to discussing the management of Hasselt Living Lab. The meeting participants also discussed the integration of the Living Lab methodology into a product development strategy and mechanism within the research institute.	The preliminary feedback received from the managing board during the meeting was positive. As a result of the team's initiative, the Living Lab activities are now registered as an agenda item for discussion in periodic strategic meetings. In addition, the Hasselt Living Lab manager is now a regular member of the strategic meetings. A follow-up discussion will be held in November, 2019 as part of the next strategic meeting.

Vantaa Living Lab



Photo © Timo Newton-Syms

“Reflecting on what our Living Lab has already done in terms of its sustainability, I can say that we have created excellent opportunities into different directions to continue our iSCAPE efforts!”

Antti Mäkelä, Head of Climate Change and Extreme Weather Research Group, FMI

Dissemination Activities

Activity

Description

Outcome

What?

YouTube-interview regarding climate change and air quality

When?

18 June 2019

Where?

Heureka Science Center, Finland

Antti Mäkelä, the Living Lab lead, was interviewed by two popular Finnish YouTube-channel stars who are currently making a program about the environmental crisis of the present time. Given that one of the program topics focused on climate change and adaptation in urban environment, the FMI's expert shared and discussed some project results and Living Lab activities. The filming was done at Heureka Science Center.

The episode of a Youtube-film series will be published in autumn 2019. This video will not only increase the visibility of FMI's research but would also help the Living Lab to reach a young audience: teenagers and young adults.

Dissemination Activities

Activity	Description	Outcome
What? Scientific presentations at various seminars (e.g. Hospital Engineering Seminar; Environmental seminar of Helsinki-Uusimaa Hospital district; the Mortality seminar of Actuar Society of Finland). When? February-May 2019 Where? Tampere/ Helsinki, Finland	iSCAPE results along with weather, climate, and air quality health impacts were presented in three different seminars. These seminars were attended by a great number of stakeholders, especially from the health sector. The high interest in this topic raised due to a recent PhD dissertation by one of the iSCAPE researchers, Reija Ruuhela (title: "Impacts of weather and climate on mortality and self-harm in Finland").	The scientific presentations raised interest among the audience and resulted in productive discussions afterwards. By disseminating its research results to various target audiences, including practitioners and discussing collaboration opportunities, the Living Lab can increase its collaborator network and potentially establish new joint initiatives related to health and climate change topics.
What? Climate change and air quality presentation When? 10 April 2019 Where? Katajanokka elementary school in Helsinki	Two invited lectures were given to students of the Katajanokka elementary school (grades four and six). These lectures were related to the school's theme of the week: 'World's Future Challenges'. Students had selected climate change and air pollution as one of the topics to be discussed during this week. The 45-minute lectures included a presentation and a question and answer session, as well as follow up discussions.	During these lectures, the students learned more about the present climate crisis, as well as how green infrastructure provides various benefits for humans and the environment they are living in. By collaborating with local schools and organizing similar activities, Vantaa Living Lab can increase the willingness of young people to participate in future co-creation activities aimed at solving climate change and air pollution challenges.
What? Presentation at the COST Action InDust end user conference When? 11-12 March 2019 Where? Rome, Italy	Living Lab achievements and iSCAPE results were presented by Athanasios Votsis/FMI in the "User Workshop on Dust Products for Air Quality" organized by EU COST Action InDust. The main objective of the inDust initiative is to establish a network involving research organizations, service providers, and potential end users.	This event enabled the Living Lab to share outcomes of the iSCAPE project to a wider audience. This was also a great networking opportunity and enabled to enhance FMI's reputation internationally.

Living Lab infrastructure and equipment

Activity	Description	Outcome
What? Citizen Kit presentation to the city of Vantaa When? 31 May 2019 Where? Vantaa city headquarters, Finland	The project sensors - Citizen Kits - and their measuring capabilities were presented to the city of Vantaa in May 2019. This meeting was organized because city stakeholders expressed their interest in using the sensors of Vantaa Living Lab to measure noise and air quality levels in specific construction sites.	Following the meeting and sensor presentation, city stakeholders decided to use the Living Lab's sensors for the desired purpose. By loaning the sensors to the city and sharing their expertise in running citizen science workshops, Vantaa Living Lab can further strengthen their relationship with the city of Vantaa.
What? Further testing and verification of the project sensors using reference equipment When? May-August 2019 Where? FMI air quality calibration/ reference lab	Three Citizen Kits and two Living Lab stations, developed as part of iSCAPE, were deployed at FMI's air quality reference/calibration laboratory. This was done to further test and verify the performance of the project sensors against reference measurements. After the laboratory tests, these sensors will be installed in a real-life setting near to the SMEAR station (cooperated by FMI and the University of Helsinki), as well as at the Air Quality Supersite of Helsinki Region Environmental Services (HSY).	Testing and validation outcomes will be available in autumn 2019. The results will inform the decision to further utilize the project sensors in joint measurement campaigns and new projects.

Fig. 29: Deployment of the Living Lab stations alongside the reference equipment at the operational air quality station of the Helsinki Region Environmental Services (HSY), November 2018, Helsinki (Finland). A larger-scale deployment with a similar set-up is planned in autumn 2019. Photo: Anssi Julkunen/HSY.



Citizen engagement and co-creation

Activity	Description	Outcome
What? Planning of the co-creation workshop with elementary school students When? June-July 2019 Where? FMI	A new co-creation activity with the Hyvinkää city elementary school to be held in autumn 2019 was planned. As part of this activity, the teacher and students will discuss how to use the project sensors (Citizen Kits) and co-design a “measurement campaign” alongside with Achim Drebs, a scientist from FMI. The sensors are planned to be used in the school area. The exact time of the campaign will be agreed in August when the school reopens.	This engagement serves the iSCAPE objectives. For example, it enables young students to examine the local environment and deepen their understanding of how it can be monitored with low-cost sensors. It also helps the Living Lab to strengthen its relationships with local stakeholders, especially public schools.

Living Lab stakeholder relationships

Activity	Description	Outcome
What? Planning of the training sessions for the stakeholders from Heureka Science Center and the city of Vantaa When? June-July 2019 Where? Heureka Science Center and the city of Vantaa	Having met with the collaborators from the Heureka Science Center and the city of Vantaa, the team has initiated planning of two seminars to be held in October 2019. These seminars will be organized with the aim to share the key project findings and highlights. The Living Lab stakeholders are especially interested in climate change in urban areas.	It is expected that such activities will increase the awareness of climate change impacts in urban areas. In addition, Heureka is visited by thousands of people annually, which means that the iSCAPE results can reach a wide audience through the collaboration with Heureka. Moreover, the city of Vantaa has expressed their interest to turn the lessons learned into practice.

Fig. 30: Stakeholders of Vantaa city, Ari Pietilä and Anna-Mari Kangas, working hard to provide feedback about the outcomes of Vantaa Living Lab efforts, 31 May 2019, Vantaa (Finland)



New initiatives and synergies

Activity

Description

Outcome

What?

Synergies with the H2020 project OPERANDUM

When?

July 2018 - June 2022

Where?

Lake Puruvesi in Eastern Finland

FMI is a partner in the OPERANDUM project (Open-air laboratories for nature-based solutions to manage environmental risks) in which the Living Lab approach is strongly present, despite the different name (open-air laboratory) being used. In this project, FMI works with other research institutes, local stakeholders, and citizens to develop solutions to improve the conditions of one major Finnish lake, Lake Puruvesi. Conditions of this lake have been getting worse, especially due to actions done in the forestry sector. This project enables FMI to apply citizen-engagement methods and lessons learned from iSCAPE when interacting with local stakeholders and citizens. These interactions constitute a significant part of the project because most of the developed solutions will take place in the land areas owned by local stakeholders and citizens.

By applying the skills and knowledge in Living Labs developed during the iSCAPE project to other projects and new initiatives, the team can achieve its goal to use the Living Lab as an instrument to solve environmental challenges.

New initiatives and synergies

Activity	Description	Outcome
What? Submission of two proposals focusing on climate and health aspects When? April 2019 Where? Helsinki	In spring 2019, a specific call focusing on climate change and health aspects was opened by Finnish Academy of Science, which is the largest national research funder. FMI's iSCAPE team developed two consortia that submitted two project proposals addressing the call requirements. Special attention was given to climate change impacts to the health in urban environments. Both of these proposals succeeded to the second round with the deadline of responses in September 2019. The iSCAPE experience contributed greatly to the preparation work and results achieved.	The successful submission of the project proposals will provide financial resources to the team to continue research on the iSCAPE-related topics (urban climate and climate change, air quality, health). This will also help to ensure the sustainability of the Living Lab activities and contribute to establish FMI as a recognized expert in urban climate modelling at the national level.

Living Lab organization

Activity	Description	Outcome
What? High-level discussion of the FMI's Living Lab strategy When? April 2019 Where? FMI	During April 2019, FMI's iSCAPE team reached out to the Executive Board of FMI to collect their views of the FMI's role in the Finnish Living Lab ecosystem. The discussion was sparked by the application that the team was preparing to externally evaluate its activities following the ENoLL Adherent Membership process.	This discussion helped to realise that FMI has already been involved in several projects that apply the Living Lab methodology. There are many examples of research projects that are built upon the quadruple-helix concept, including academia, the private sector, policy makers, and citizens. It was also clarified that, typically, individual research groups and units embrace the Living Lab approach depending on their projects and available funding. These insights helped the team to shape their strategic goals and define a Living Lab as an instrument they will use in the future projects.

6. Conclusions

During the course of the project, the iSCAPE Living Labs have climbed up a steep learning curve. Setting up and managing Living Labs without previous experience in Living Lab operations was a great challenge for most of the project partners. Even more so, the project partners had limited resources (time, personnel, budget) available for Living Lab activities. However, despite these constraints, each Living Lab was not only able to achieve their objectives set within the framework of the iSCAPE project, but they were also able to demonstrate a sound maturity level developed during the project.

To sustain the Living Lab components developed as part of iSCAPE, each Living Lab dedicated significant efforts to enhance the life of their Living Labs beyond the project. These efforts included the assessment of the Living Labs (“Where are we now?”), development of the long-term goals (“Where do we want to be?”), and planning of the actionable initiatives (“How do we get there?”). The individual plans were designed such that the Living Lab mindset, physical and virtual infrastructure, knowledge, and skills developed during iSCAPE are preserved after the project completion.

To ensure impartiality and facilitate this process, the Living Labs were externally evaluated by three experts from the ENoLL’s network of long-standing practitioners following the process of the 13th wave for ENoLL Adherent Membership. In addition, a set of recommendations and guidelines were provided to the project Living Labs by the ENoLL experts to achieve long-term sustainability. Some of the recommendations included the development of a transparent governance and management model with clear roles and responsibilities, improved coverage of the value chain, creation of a unique identity for each individual Living Lab in addition to the development of a viable business model. Furthermore, the throughout assessment, which encompassed self-reflection, external evaluation, and cross-analysis of the project Living Labs, revealed many lessons in terms of what went well and what could be improved upon. These were summarized into a set of guiding principles and written in a fun and memorable format for the project Living Labs to consider for their sustainability. For example, one of the principles “It’s not just a band, it’s a business” suggests “getting the band together”, and “writing an album” while another principle “Write the Living Lab scenario” encourages Living Labs to “get their crew together” and “write their scrip”. These guiding principles offer not only the project Living Labs, but also the larger Living Lab community some valuable lessons that have emerged from the project, and therefore can be of practical value beyond the iSCAPE project.

It is also worth noting that by integrating both self-assessment and external evaluation of the project Living Labs, iSCAPE developed a unique assessment approach. This was possible due to an unprecedented opportunity provided to the project partners by ENoLL to evaluate the project Living Labs following the process of the 13th wave for ENoLL Adherent Membership. The external evaluation of the project Living Labs helped to gain a deeper understanding and a more comprehensive overview of the current state and maturity of the Living Labs. This approach can be beneficial for other emerging Living Labs or similar research and innovation projects.

Following the external evaluator feedback and considering the individual strengths, weaknesses, threats, and opportunities, each Living Lab developed a set of long-term goals to define where they want to be in the future. These goals were then used to develop individual action plans with the objectives to be achieved during the following years. As these plans demonstrate, the project Living Labs are committed to sustaining the Living Lab mindset, physical and virtual infrastructure, knowledge, and skills developed during iSCAPE and are planning to continue their operations beyond the project. An individual approach to each Living Lab ensured that the unique circumstances of the Living Lab and characteristics of the local innovation ecosystem were considered when developing a plan for extending the life of the Living Labs beyond iSCAPE.

In reflection, each Living Lab has recognized the importance of obtaining additional funding to sustain their activities and have already taken necessary steps to consider several funding opportunities. From the reported activities it can be observed that project partners have dedicated efforts to developing new project proposals and have explored synergies with other projects and initiatives to obtain funding for the Living Lab operations. They also paid close attention to dissemination activities to increase the visibility and impact of the project outcomes, which in return enhanced the likelihood of obtaining new funding. In addition, the Living Labs are further utilizing the project infrastructure and equipment, and are working closely with the key stakeholders to strengthen the established relationships.

By and large, the iSCAPE project has opened up multiple opportunities to continue Living Lab efforts as highlighted by some of the Living Lab leads. They also note in retrospect that the project has been a great learning experience and has enabled their teams to grow by developing new skills and gaining valuable experience. That being so, the project partners will keep learning and finding new ways to collaborate and co-create beyond the project in all likelihood.



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