# iSCAPE
# Playbook

2019

# Contents

This playbook is for anyone interested in the **Living Lab concept, and its collaborative approach for tackling urban and environmental issues.** Ahead, you will learn about the iSCAPE Living Labs journey taken over the past three years, and we'll share necessary tools and lessons learned in making **invisible air pollution, more tangible to citizens and city stakeholders.**

# How to use this playbook

If you are **new to iSCAPE** go to

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If you are **already familiar with iSCAPE** but **new to Living Labs**, head to

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If you want to know **how to launch an air quality Living Lab in your own city**, go straight to

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If you are curious about the **urban challenges and lessons learned** in our six Living Labs, jump to

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# What is iSCAPE?

iSCAPE – or, to give it its full name: **I**mproving the **S**mart **C**ontrol of **A**ir **P**ollution in **E**urope – is a research and innovation project funded under the European Union's H2020 programme. Over the past three years, iSCAPE worked to reduce urban air pollution and the negative impacts of climate change across European cities. To do this iSCAPE leveraged sustainable passive control systems, behavioural change initiatives and the living lab approach. You can find out more on our website: www.iSCAPEproject.eu

Six iSCAPE Living Labs were set up as part of this project: Bologna (Italy), Bottrop (Germany), Dublin (Ireland), Guildford (UK), Hasselt (Belgium) and Vantaa (Finland).

Each of these cities has introduced one or more air quality interventions for the past three years. These have varied from green infrastructure (Bottrop, Guildford, Vantaa, Bologna) to low boundary walls (Dublin), photocatalytic paint (Bologna) and encouraging behavioural change in their citizens (Hasselt).

To have the greatest impact, each Living Lab ensured the interventions in each city were co-created through active citizen and stakeholder engagement activities.

# What did we achieve?

## We started with:

**6** Living Labs across cities in Europe

**7** Pilot schemes

**€5.85m** Budget

**15** Partners

## Achievements:

**12** Living Lab monitoring stations were set up

**50,000+** of climate change and mobility simulations

Engaged with **1200+** people

**80** Smart Citizen Kits were distributed across the Living Labs (with an additional 500 sold in 2019)

**880+** Twitter followers

**12** citizen science workshops with a total of **93** participants were delivered across six iSCAPE cities

**30+** event/workshop activities were we engaged with more than **1,200** participants
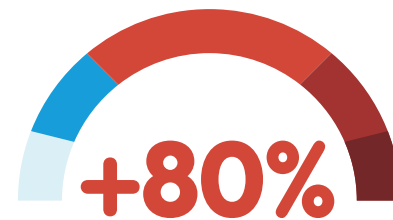
# The iSCAPE challenge

Cities worldwide are facing air pollution challenges and suffering the negative impacts of climate change – a reality that now affects our everyday lives.

According to the World Health Organization (WHO), air pollution is one of the biggest environmental and health challenges of the 21st century. Poor indoor and outdoor air quality is attributed to around 8 million deaths globally (WHO, 2016). An estimated 91% of the world's population still lives in regions where air pollution levels are higher than WHO-specified limits (WHO, 2016).[1]
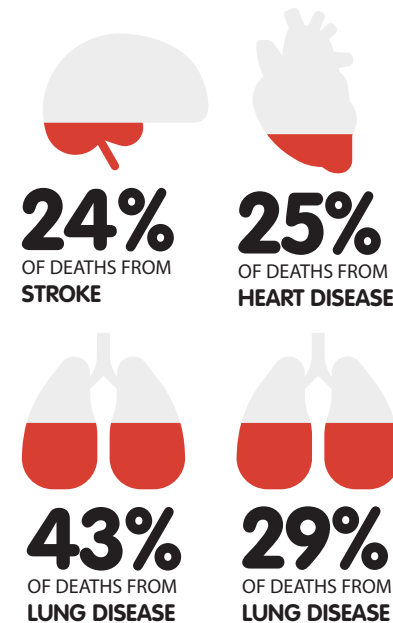
As well as health risks, air pollution is also damaging our environment and ecosystems by causing acid rain, haze, eutrophication, ozone depletion, crop, forest and wildlife damage and, perhaps most alarmingly, global climate change.

With the above challenges in mind a core focus of the iSCAPE challenge was finding new ways to make the negative effects of air pollution more relatable and tangible to local citizens. Additionally, we explored the best ways to expand on our work and share these successes to other citizens and places around the world.

1: https://www.who.int/airpollution/en/
2. https://breathelife2030.org/

**Over 80%** of urban residents are exposed to air pollution levels that exceed WHO limits[2]

**+80%**

## Air pollution may not always be visible, but it can be deadly

**24%**
OF DEATHS FROM
**STROKE**

**25%**
OF DEATHS FROM
**HEART DISEASE**

**43%**
OF DEATHS FROM
**LUNG DISEASE**

**29%**
OF DEATHS FROM
**LUNG DISEASE**

## The link between air pollution and climate change:



**1** Solar radiation passes through the atmosphere.

**2** Some solar radiation is absorbed by the earth's surface and heats it up.

**3** Some solar radiation is re-emitted from the earth's surface as infrared radiation and passes through the atmosphere.

**4** Some of the infrared radiation is absorbed and re-emitted by **greenhouse gas molecules.**

ATMOSPHERE
OZONE LAYER
GREENHOUSE GASES
AIR POLLUTANTS

**CLIMATE RELATED POLLUTANTS**

- CFCs Chlorofluorocarbons
- $CO_2$ Carbon Dioxide
- $H_2O$ Water Vapor
- $N_2O$ Nitrous Oxide
- $O_3$ Ozone
- $CH_4$ Methane

Pollutants that affect both climate and air quality

- $CH_4$ Methane
- $O_3$ Ozone
- CO Carbon Monoxide
- PM Particulate Matter
- $SO_2$ Sulphur Dioxide
- NOx Nitrogen Oxides
- $NH_3$ Ammonia
- VOC Volatile Organic Compounds
- HC Hydrocarbon

**HEALTH RELATED POLLUTANTS**

Before the Industrial Revolution greenhouse gas emissions were caused mainly through natural processes like animal and plant respiration. Since then, human activities like fossil fuel use and deforestation have increased the amount of emissions entering the atmosphere, contributing to the warming of the Earth's surface.

Some air pollutants are directly emitted into the atmosphere e.g. from vehicle exhaust or chimneys and some others are formed through oxidation and reaction between them.

Air pollution is the world's deadliest environmental problem. It kills 7 million people prematurely each year, or one in eight deaths globally.

# The iSCAPE vision

iSCAPE's overall vision is to provide the tools – grounded in evidence-based analysis and integrated into urban design and policy decisions – to achieve a low-carbon society free of air pollution. To ensure its ability to engage inclusively with all citizens, iSCAPE adopted a human-centred, collaborative and iterative approach.

**University of Surrey (UoS)**
- Assessment of urban air quality and climate change solutions.

**Future Cities Catapult (FCC)**
- Living Lab set-up and management.

**University of Hasselt (UH)**
- Location based framework and deployment of behavioural solutions.

**University College Dublin (UCD)**
- Monitoring and evaluation of interventions.
- Ethics requirements.
- Exploitation.

**University of Bologna (UNIBO)**
- Simulating effects in terms of air pollution and climate change.

**T6**
- Communication, dissemination and stakeholder involvement.

**University of Dortmund (UCD)**
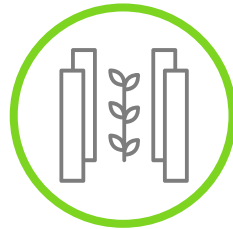- Management and coordination.

**Institute of Advanced Architecture of Catalonia (IAAC)**
- Planning and evaluation of Passive Control Systems solutions.

# What was our methodology?

The iSCAPE framework consists of **two kinds of interventions**, one acts as air pollution dispersion (PCS) and the other one reduces emissions (BC):
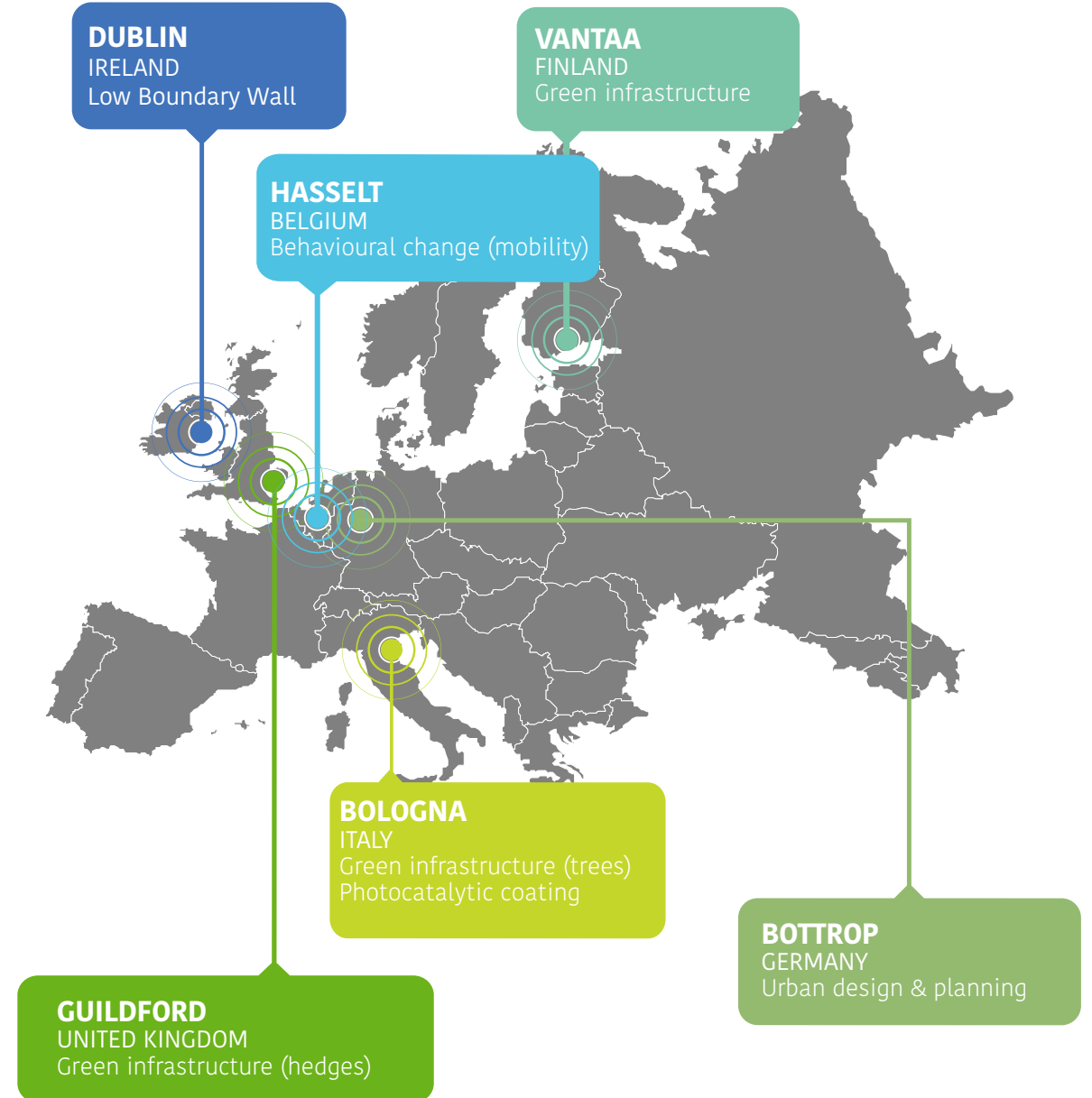
## Passive Control Systems (PCS)

Passive Control Systems include physical interventions such as low boundary walls, trees, hedgerows, green walls and roofs, photocatalytic coatings, and green urban spaces.

## Behavioural Change (BC)

Behavioural Change is a set of interventions and actions that promote sustainable transport mode choices for citizens and changes in activity patterns.

In order to assess, test and realise air quality and climate change interventions, **we created Living Labs in six European cities.** Informed by the unique challenges faced by each city, the Living Labs deployed, monitored and evaluated different physical or behavioural intervention informed by the unique challenges the city faces in terms of environmental, social and economic impact.

**DUBLIN**
IRELAND
Low Boundary Wall

**VANTAA**
FINLAND
Green infrastructure

**HASSELT**
BELGIUM
Behavioural change (mobility)

**BOLOGNA**
ITALY
Green infrastructure (trees)
Photocatalytic coating

**BOTTROP**
GERMANY
Urban design & planning

**GUILDFORD**
UNITED KINGDOM
Green infrastructure (hedges)

# How we did it

iSCAPE supported the deployment of physical interventions and **Passive Control Systems** (PCS) to improve the ventilation rate in urban areas and to decrease the effects of air pollution and climate change. To maximise impact these interventions were combined with various other initiatives and actions designed to promote **behavioural change** at both the individual and local urban level.

One of them is **active community engagement** which is fundamental for creating value and increasing public awareness of air pollution control. Citizens were at the heart of designing, testing and validating the interventions in each iSCAPE Living Labs. This empowered community action and involved individuals in urban decision making.

## Sensor technologies

iSCAPE encouraged the deployment of a network of sensors to develop baseline data and assess the benefits of each intervention on both a neighbourhood and city-wide scale. The iSCAPE monitoring station and the iSCAPE Smart Citizen Kit[3] (low-cost) sensors were developed to provide alternative solutions to measure air pollution and engage citizens in tackling environmental problems.

## Interventions

In iSCAPE we used two types of interventions: Passive Control Systems – which includes physical interventions such as low boundary walls, and Behaviour Change – which explored new/sustainable modes of transport and citizens change in activity patterns (see more on page 14).

## Co-creation

Within the iSCAPE Living Lab context, co-creation involves the Living Lab working with key audiences on a common problem towards a common goal. Our iSCAPE Living Labs collaborated with experts, citizens and other stakeholders to develop, refine and advance their interventions. Through working with diverse audiences, Living Labs gained a better understanding of participants' needs, perceptions, and local challenges.

## Citizen science

Combining citizen engagement, sensor technologies and scientific data collection, we developed an iSCAPE Citizen Science framework[4]. This allowed the Living Labs to engage with their local community, and collect and analyse air pollution data. The findings were used to develop action plans and proposals of how findings might inform policy design and behaviour change.
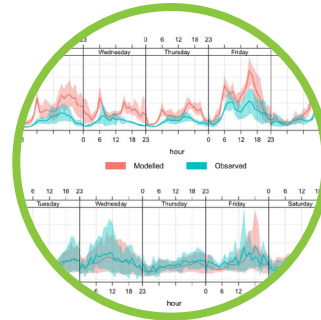
## Simulations and modelling

Some iSCAPE Living Labs ran simulations of mobility and climate change scenarios. The Living Labs presented the simulation results back to their municipality stakeholders in workshops. The aim was to improve their understanding of the concept and to test the efficacy of simulations as a policy-making method. Additionally, simulations were also run to assess the effectiveness of the interventions in each city.

3. Smart Citizen Platform: https://docs.smartcitizen.me/

4. Citizen Science Guide: www.iscapeproject.eu/wp-content/uploads/2019/09/iSCAPE-CitizenScience-Guide.pdf

# Who was the iSCAPE team?

The iSCAPE team represents a vast range of disciplines, including engineering, climatology, physics, urban planning, sociology, cultural anthropology, human-centred design, hardware and software development, economics and policy-making.

iSCAPE Living Labs are being led by research institutions and local universities (UH, UCD, UoS, UNIBO, TUDO, FMI).

# What is a Living Lab?

Living Labs are practice-driven organisations that facilitate and foster open, collaborative innovation, across real-world environments/areas where both open innovation and user innovation processes can be studied and new solutions co-created (European Network of Living Labs, 2017).

A HUMAN CENTRED APPROACH

DONE IN COLLABORATION WITH OTHERS

TO EXPERIMENT IN REAL LIFE SETTINGS

# Our six iSCAPE Living Labs

iSCAPE Living Labs have been created in six European cities: Bologna, Bottrop, Dublin, Guildford, Hasselt and Vantaa, with each location assessing and tackling air pollution from their own unique perspective.

The iSCAPE Living Labs assessed the effectiveness of a number of passive control systems and behavioural change initiatives to reduce urban air pollution and address the negative impacts of climate change. The Living Labs also equipped citizens with Smart Citizen Kit sensors to measure air pollution locally, by doing so they fostered collaboration and knowledge sharing between a wide variety of stakeholders.

## Bologna

**Focus**

- Air quality mitigation based on urban vegetation and trees.
- Assessment of solutions against climate change.
- Microclimate modelling.
- Sensing and monitoring through new technologies.

**Vision**

Raise awareness about air quality and the impact of passive control systems to reduce air pollution.

**Intervention**

Green infrastructures and Photocatalytic coating (Lazzaretto).

## Bottrop

**Focus**

- Urban planning and design.
- Urban greening.
- Citizen involvement in spatial planning.

**Vision**

Involve citizens and local stakeholders in city greening initiatives with the objective of improving air quality and enhancing the wellbeing of citizens.

**Intervention**

Urban design

# Dublin

### Focus

- Urban interventions both physical and policy-based.
- Sensing and monitoring technologies.
- Modelling.

### Vision

Enhance dialogue between different stakeholders. Ensure peoples voices are heard to generate solutions that address problems such as air quality and climate change.

### Intervention

Low Boundary Wall



# Hasselt

### Focus

- Behavioural change.
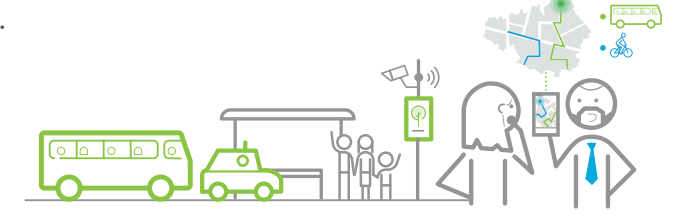- Integration of travel behaviour and air quality models.

### Vision)

Encourage pro - environmental behaviour among city residents by designing Information-based behavioural interventions.

### Intervention

Changing travel behaviour for greener cities.



# Guildford

### Focus

- Air quality and air pollution.
- Green infrastructure.
- Sensing and monitoring technologies.

### Vision

Raise citizens' awareness of air quality and impact of green infrastructure in reducing air pollution and improving health and wellbeing.

### Intervention

Low Boundary Wall (using hedges and trees).



# Vantaa

### Focus

- Urban climatology.
- Meteorological and environmental modelling.
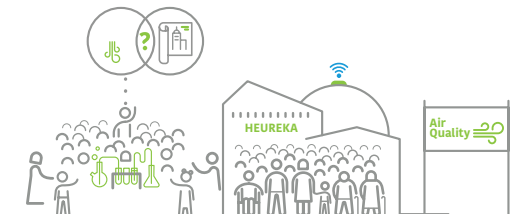- Climate change projections.
- Environmental economics.

### Vision

Raise awareness of citizens and city stakeholders about air quality and impact of green infrastructure to reduce air pollution and provide socio-economic benefits.

### Intervention

Assessing green infrastructure.

**Bottrop Living Lab mapping with trees during a co-creation workshop.**

# Key Principles

The iSCAPE project considers the following characteristics as essential for Living Lab activities:

**Active user involvement –** engagement with diverse user groups in order to understand and meet user needs and desires.

**Real-life setting –** experimentation in a real environment, unlike a laboratory setting.

**Multi-stakeholder participation –** cross-collaboration between local government, citizens, universities, and small and large businesses.

**Multi-method approach –** the introduction of a variety of Living Lab methods and tools in the innovation process (enhance co-creation, collaboration and communication).

**Co-creation –** essential process to distribute different knowledge, values, expertise, and needs. Central process for value creation in Living Lab.

Throughout the iSCAPE project, we simplified this approach even further for the purposes of citizen engagement in order to help our partners and stakeholders to further understand the concept. The iSCAPE Living Lab principles can be summarised simply as:

"A human-centred approach, done in collaboration with others, to experiment in a real-life setting."

Summarising the iSCAPE Living Lab principles, Future Cities Catapult team.

# Who participates in Living Labs?

Living Lab projects connect a broad range of different local stakeholders by actively facilitating collaboration and knowledge sharing between them. This multi-stakeholder approach provides an opportunity to align different interests and expectations, as well as bringing together multidisciplinary expertise and experience.

In Living Labs, participants from **academia, businesses, and the public** sector work together to create products and services to meet the needs of citizens. A human-centred design approach such as this is critical for the development of appropriate and innovative ideas that solve local challenges. **Citizen and local stakeholder engagement** is fundamental for value creation and increased public awareness of air pollution control. This plays a central role in the activities of iSCAPE Living Labs.

**Government**

**Industry**

**LIVING LAB**

**Citizen**

**Academia**
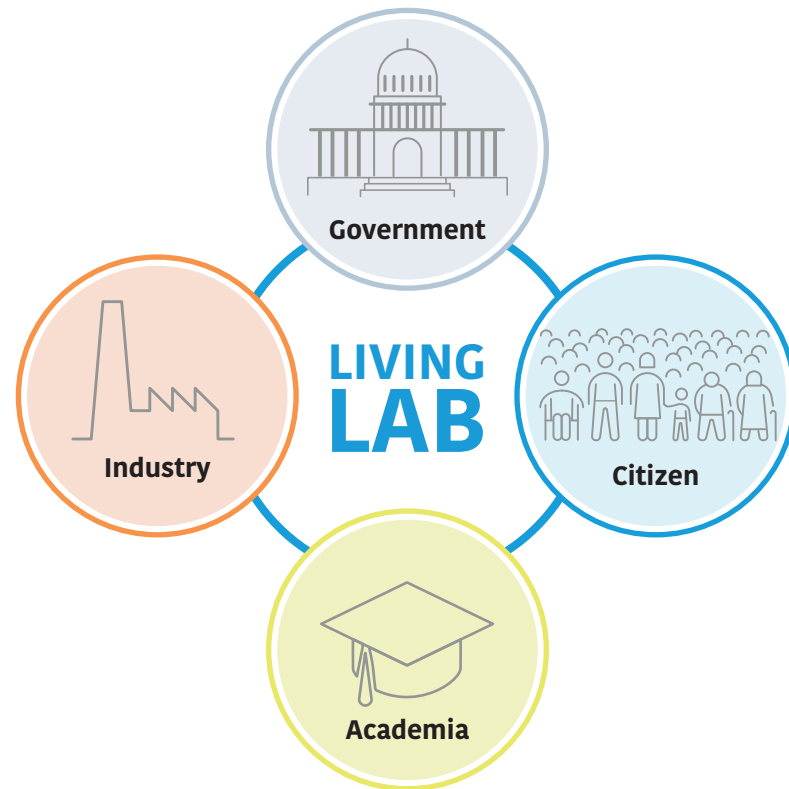
**Quadruple helix model:** The Living Lab approach manages and contributes to local and transnational exosystems and interdisciplinary teams which foster inclusion within urban and regional context. (European Network of Living Labs)

“I learned different techniques to create a workshop and have a better understanding of what green infrastructure is in a practical sense.”

Workshop participant, Bologna.

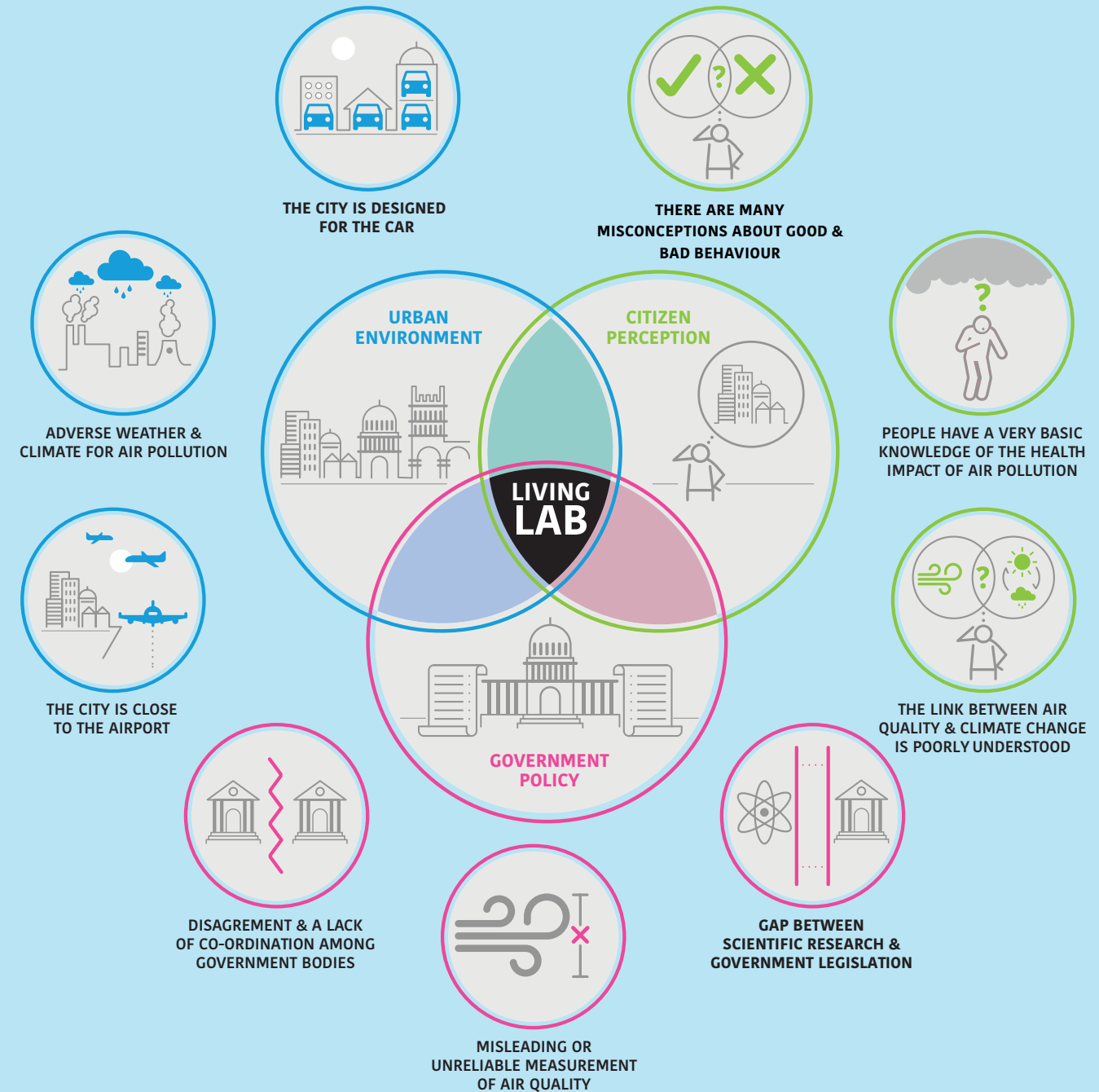Bologna Living Lab co-creation workshop 2019.

# Why Living Labs are great for tackling urban challenges

In the first year of the iSCAPE project, a set of urban challenges focusing on air quality and climate change was identified. We iterated those challenges based on experiences and lessons learned over the following three years. Although iSCAPE city-specific, we believe many of the challenges are shared with other cities around the world. These challenges can be easily used to create a framework for future Living Labs. Either as a conversation starter for air quality and climate change challenges or as inspiration for creative solutions.

Our six cities used these areas to develop interventions that matched city-specific challenges, as well as identify the specific activities of the iSCAPE Living Labs.

**These challenges were split into three overarching areas:**

- **Urban Environment –** the geographical elements and design of the city.

- **Citizen Perception –** the thoughts and behaviours of the citizens who live in each city.

- **Government Policy –** including the organisation of government bodies and legislation they introduce.



THE CITY IS DESIGNED FOR THE CAR

THERE ARE MANY MISCONCEPTIONS ABOUT GOOD & BAD BEHAVIOUR

ADVERSE WEATHER & CLIMATE FOR AIR POLLUTION

PEOPLE HAVE A VERY BASIC KNOWLEDGE OF THE HEALTH IMPACT OF AIR POLLUTION

URBAN ENVIRONMENT

CITIZEN PERCEPTION

LIVING LAB

THE CITY IS CLOSE TO THE AIRPORT

THE LINK BETWEEN AIR QUALITY & CLIMATE CHANGE IS POORLY UNDERSTOOD

GOVERNMENT POLICY

DISAGREEMENT & A LACK OF CO-ORDINATION AMONG GOVERNMENT BODIES

GAP BETWEEN SCIENTIFIC RESEARCH & GOVERNMENT LEGISLATION

MISLEADING OR UNRELIABLE MEASUREMENT OF AIR QUALITY

# How to set up your own air quality Living Lab

In this chapter, we have developed eight steps to help you on your journey towards launching a Living Lab project. However, it's important to remember that every project is different, and as such, these steps should be discussed, iterated and adjusted based on the challenge the Living Lab is aiming to tackle, the resources and the needs of the project. These considerations are not set in stone.

Bottrop Living Lab during their first 'Wandering Tree' parade.
The parade was part of their citizen engagement campaign.

"The idea of having trees wandering around in the
 city is great. It is an innovative and creative way
 to get people involved and sensitized."

Representative of the City of Bottrop.

## 1. Assessment of challenges

What environmental, social or governmental (ESG) challenges
are most urgent in your local community or city?

**You can discover these by:**

- Undertaking desk-based research and academic literature reviews.

- Qualitative and quantitative research methods such as interviews, shadowing
  exercises (overseeing the area of interest without engaging) and surveys.

- Mapping exercises with potential partners, local communities and affected groups.

## 2. Identify local partners

What relationships and skillsets are needed in your project to implement the Living
Lab approach?

**You can establish this by:**

- Making sure you cover each stakeholder group of the quadruple helix (see page 30).

- Engaging with local organisations and attending subject-related meet-up groups.

- Arranging catch-ups with relevant SMEs, local government and university experts.

- Getting urban decision-makers on-board.

### 3.  Identify citizens, local groups and communities

Who is your audience and what communities need to get involved?

**You can understand this by:**

- Engaging with community groups and attending subject-related meet-up events or town hall meetings.

- Building relationships with community leaders and influencers. Invite them to meetings and workshops.

- Employing the knowledge and insight of these stakeholders will inform the project about potential non-technical risks of specific interventions, trust-issues, belief and cultural context.

- Piggybacking on other events such as those held at local community centres, universities, churches and meet-up groups etc.

"I feel sure this event has helped bring both University and local residents closer together and now provides an opportunity to take such studies forward in a jointly cooperative way."

Participant, Guildford.



Guildford Living Lab at the Waterloo Festival 2018.

**4.** Collaboratively develop solutions addressing local challenges

What kind of methods does your Living Lab need to work across disciplines?

**This can be clarified by:**

- Defining and mapping your challenges in collaboration with citizens and partners. Ensure you share the responsibilities and define clear steps to achieving the Living Lab's goals.

- Organising open co-creation sessions such as workshops, sprints, hackathons, festivals, mapping and ideation exercises.

- Prototyping and testing in a real-life setting as well as digital prototyping such as modelling, simulations and the use of digital twins.

- Having follow-up session. This will make participants feel like collaborators not just participants.

- Including feedback loops. Integrate workshop outcomes and research findings in your prototypes.

**5.** Framework for evaluation and impact assessment

What metrics and indicators are needed to create a strong evaluation and assessment system?

**This can be established by:**

- Learning from previous evaluation frameworks and assessment models.

- Defining high-level impact goals from the very start, creating steps and assigning responsibilities for how to achieve those goals.

- Being flexible and iterating those structures along the way.

- Using modelling and simulation technologies (eg, digital twins) for initial prototyping such as adjusting urban infrastructures and mobility models for air pollution reduction.

- Making sure to create a framework for data collection such as citizen science activities and other sensing technologies.

Hasselt Living Lab during one of their citizen science workshops.

## 6. Communication and dissemination

How can the project story and message reach a wide and diverse audience?

**This can be achieved by:**

- Considering all types of media to communicate and share the project results. These might include, online and social media, newspapers, newsletters, blogs, conferences and festivals.

- Targeting influencers within your community is a good way to spread information, for example local politicians, local businesses or prominent local figures.

- Making sure your communication creates awareness and educates your audience.

- Documenting lessons learned in a way that's easy to access and digest.

- Creating an on-boarding process that shows how citizens, industry, academia and government can contribute to the Living Lab.

- Outlining scaling opportunities and provide frameworks so the work of the Living Lab can be continued or adapted.

## 7. Policy change and implementation

How can we ensure the research and findings will influence city strategies and inform policies?

**This can be achieved by:**

- Working with the government partner to develop further relationships and engage them in the project.

- Co-creating with the public to identify what kind of policies or regulations would be most attractive and useful for them.

- Involving city stakeholders and local government in workshops and meetings in order to keep them updated.

- Gaining an understanding of what your city's policy design process looks like (it helps to draft a high-level user journey or flow diagram), pinpointing where your Living Lab can provide knowledge and input.

## 8. Scaling and long-term strategy

How can the legacy of the Living Lab project be ensured?

**This can be done by:**

- Developing a strategy that encourages life after the initial Living Lab project (eg, local authorities set up to take over, SMEs or community champions continue with the engagement).

- Building collaboration sessions into local government workflows such as the policy design process.

- Staying in touch with partners through regular events.

- Organising meet ups to share the Living Lab's goals and results.

- Developing guides and frameworks that can be easily adapted for other challenges and cities.

- Applying and reaching out to other funding bodies to secure the financing that is essential to sustaining Living Lab activities.

# From Theory to Practice: Our Learnings

You will be very close to setting up your own Living Lab if you have successfully followed the previous steps. But before you do, we have collated **eight key learnings** based on observations made in each of the six iSCAPE Living Labs over the three years of the project.

# Living Lab Mindset

For iSCAPE, establishing a 'Living Lab Mindset' was a key priority. Living Lab members should be open and willing to adopt a citizen-centred approach to work collaboratively in a real-life setting. This approach is also critical when it comes to planning Living Lab activities and developing a future vision.

## Linking activities to interventions and pilot development

One objective of a Living Lab is to advance potential solutions through co-creation with citizens and/or stakeholders. For some Living Labs, co-creation may not always be immediately possible for a number of reasons, such as waiting for municipality engagement or the need for facilitators to develop co-creation skills.

**Recommendations:**

• Initiatives that aren't directly linked to this intervention or the topics of air pollution and climate change could still be a valuable source of information.

• Conferences and public events are great opportunities for networking, sharing lessons learned and learning more about Living Lab techniques from other practitioners.

• Move from passive contact (eg, emails) to active citizen engagement (eg, events).

• Introduce ideation/brainstorming and co-creation workshops.

• Consider how best to encourage greater involvement from citizens and community groups in the design of the intervention.

• Open up data sets and tools to the public.

# Collaborative Relationships

Living Labs should be aware that city stakeholders may initially not know enough about how Living Labs work, who should be part of the collaborative process and why the concept might be better suited to their current way of working or problem solving.

## Building relationships with municipalities

The Living Lab concept only works if the municipality is on-board. Real-life testing, data collection and policy change can only come about through meaningful engagement with proactive city stakeholders. For some iSCAPE Living Labs, this relationship was strong before the project started, but for others, it was something that needed to be established.

## Reaching out to sponsors and funding bodies

Think about organisations with broad synergies with your Living Lab you could reach out to. Funding is essential to keep Living Lab activities moving forward.

**Recommendations:**

- Think creatively about organisations that might be willing to get involved, define goals and ways of working together with all partners.

- Partnering with local community spaces and other organisations will help embed the Living Lab in the city.

- When communicating to potential new partners, explain what a Living Lab is and how the approach works in practice by providing examples and case studies.

- Build a trusting relationship with your city stakeholders and don't over-promise on what you can deliver. Explain the importance of involving them and their citizens in a Living Lab, and keep them informed on a regular basis.

# Time and Project Management

Maintaining relationships and managing pilots and other Living Lab activities requires considerable time and resources. Each iSCAPE Living Lab managed their projects through a single project lead or as a team. Nevertheless, despite the Living Labs' best efforts sometimes interventions and/or citizen engagement activities required higher than expected level of logistical effort. This can often lead to delays due to coordination and time management issues.

## Underestimating effort required for Living Lab activities

For most Living Labs, the number of person-hours and time required to establish relationships with the municipality, citizens and other stakeholders exceeded their expectations. This was particularly noticeable for those starting with a small ecosystem of external contacts or where relationships, especially with the municipality hadn't been formally established previously.

## Consider the holistic needs of the Living Labs project

Time is needed to define the engagement direction, processes, lines of communication and activities. This in turn often means tasks are under time pressure. Engagement can also include unexpected costs linked to infrastructures (eg, a venue to host the sessions), materials (eg, leaflets, flyers, refreshments) or incentives to trigger the initial citizen involvement.

## Permission and approval

Living Labs need to factor in time for both seeking approvals to undertake research with people and deploying interventions in the city itself. However, it might not always be clear which approvals are required, who the authorising body might be, or how to apply.

**Recommendations:**

- Employ a Living Lab coordinator or manager whose role is full-time and focused on the project.

- Planning helps identify where there is a lack of time, skills and resources.

- Allow for time to form relationships, bearing in mind that relationships are built up through several encounters and introductions over time.

- Identify what approvals are needed when working with the public or prototyping in a real-life setting as well as any further ethics approval, deployment of physical interventions, data collection and privacy, institutions of learning or care.

# Expertise and Skilled Resources

Depending on the lead organisation, Living Labs might need to clarify which skills are already present and which are still required to achieve the Living Lab goals. Living Labs need the relevant expertise and skills to tackle challenges from different angles. While iSCAPE Living Labs did collaborate with experts, they also had to learn many new skills, especially around co-creation, citizen engagement and policy design.

## Lack of in-house expertise

For some Living Labs co-creation was something that could not be done immediately for a number of reasons, such as waiting for municipality engagement, or the need to develop co-creation skills. However, the Living Labs quickly overcame the lack of in-house expertise through trainings and reaching out to other partners who might be willing to share learnings.

## Learning by doing – if there is enough time

Most iSCAPE Living Labs learned new methods and processes and skills along the way. While this is a perfectly reasonable approach, it can be very time consuming and potentially frustrating if things don't go as planned.

**Recommendations:**

- Find partners with the necessary skills to complement your Living Labs skills.

- A multi-disciplinary team is essential to work across different sectors and engagement levels.

- Collaborate with citizen groups and experts that bring experience relevant to the Living Lab.

- A project manager should develop a solid road map and resource plan to manage time and relevant skill sets required.

# Citizen Engagement

Citizen engagement needs to be nurtured throughout the Living Lab project. Living Labs have to reach out, develop connections, brief community champions and onboard individuals and groups. They must develop trust and establish a feeling of ownership over the project. A common learning experience for iSCAPE was the recruiting of diverse participants and exploring ways to incentivise citizens to participate.

## Recruitment of suitable participants

Some Living Labs experienced difficulties engaging with the community – for example, some citizens failed to respond to email invitations to events or workshops. With a limited budget, Living Labs need to be motivated by the Living Lab activities alone.

## Maintaining participants motivation

Participants are likely to experience a drop in motivation if they don't feel any benefit from the activity. Living Labs need to understand what motivates participants to engage and ensure they understand and appreciate how they add value to and benefit from each activity.

**Recommendations:**

- Don't take other's time for granted. Make sure participants are given a reason or personal incentive for joining in with Living Lab activities.

- Recognise that in-person meetings are essential for relationship-building. It's the Living Lab's responsibility to reach out to these groups and attend events where participants can meet face-to-face.

- Be flexible when working with different audience groups, consider time and location when planning activities. It's important to remember that, **particularly in their formative stages, Living Labs need participants more than the participants need Living Labs.**

- All citizen engagement should be inclusive, which can mean anything from accessible technology to access to a location and so on.

# Ethics & Data Collection

This refers to data protection, privacy issues (eg, GDPR) and the permissions needed for the execution of the iSCAPE interventions, citizen engagement activities and data collection activities.

## Ensuring participant safety

Many Living Labs reached out to and recruited a diverse group of participants. Young people - ranging from children to university students - were the most common group at iSCAPE Living Labs. For this reason, they had to undergo different processes and checks to ensure the appropriate protocols were in place.

## Activities tailored to the audience

Living Labs must carefully weigh up activities for any given audience group and tailor the activity accordingly. This is especially critical if the Living Lab has minimal experience of interacting with that group. The iSCAPE Living Labs learned the groups they worked with each had particular strengths/weaknesses, which in turn determined activities and levels of involvement deployed, and level of support required.

**Recommendations:**

- When working with young or vulnerable participants, the following elements must be considered: duration, location, timing, eligibility of personnel (eg, security clearance), language and chaperone or parental oversight etc.

- Collaborate with, and accept advice from, data and ethic experts, especially when deploying sensors in a public space. Ensure everything is anonymised, well communicated and transparent.

- Organise permissions as early as possible as this often takes a lot of time. Consider identifying all relevant authorities (eg, city council, town planning, police, schools).

- Think about consent when using photography or videography, data collection, interviews and testing in public spaces and forums.

# Communicating the Project

Good communication is critical for keeping people engaged with the Living Lab. It makes the intervention tangible for citizens, the purpose of the project explicit and should explain the intervention in simple terms. The entire project, from initial setup to final results and integrating citizen feedback needs to be communicated.

## Different communication channels and strategies

Living Labs are made up of different partner groups – industry, academia, government and citizens – each with different ways of working, digesting information and communicating. These differing priorities and objectives need to be accommodated by the Living Lab projects.

## Engaging content that motivates and calls for action

Sharing results with the public and using social media channels is very important to gaining momentum and developing an audience. However, the content needs to be easily accessible and useful for its intended audience.

**Recommendations:**

- Audience specific communication strategies should be established from the outset.

- Using the appropriate local language helps people understand how air pollution is likely to affect them personally, and how they can have a practical and meaningful impact on the quality of the air they breath.

- Be proactive in communicating the benefits of a Living Lab.

- Involve science and technology education experts.

- Providing a recognised point of contact for participants to get in touch with, this strengthens engagement and fosters long-term engagement.

- Think about how gamification and creative visualisation might help participants engage more enthusiastically in the intervention and Living Lab.

**iSCAPE citizen engagement principles:**



MAKE IT SIMPLE
MAKE IT VISIBLE
MAKE IT PERSONAL
MAKE IT PRACTICAL
MAKE IT PLAYFUL

**CITIZEN ENGAGEMENT PRINCIPLES**
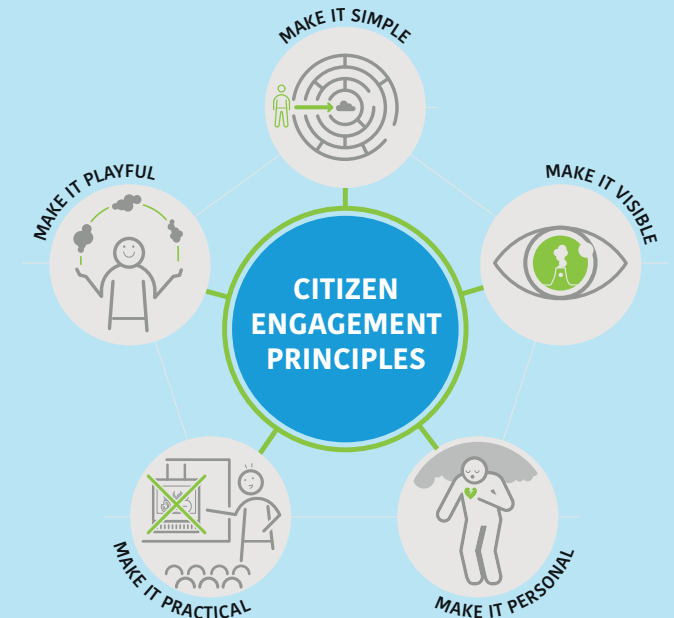
# Making an Impact

The value of this work lies in its long-term impact and lasting effects on cities and their citizens. Key ambitions are to drive behaviour change and ensuring the longevity and replicability of projects. It's critical to ensure lasting impact is made.

Living Labs should have a clear idea of where and how they want to create this impact, and as such, their established relationships with the city should be aligned with their approach and outcomes.

## Creating awareness around air quality

One of the key impacts iSCAPE created across the six cities was awareness. Awareness around air pollution, hot spots in each city, how to prevent and minimise air pollution, what policies that could tackle air pollution, and much more. By educating and spreading tangible information, citizens, as well as city representatives, can become more aware and take action.

## From findings to policy change

During iSCAPE, the Living Labs worked on influencing policies and behaviour change. A major learning experience for many Living Labs was how to work with their cities, in particular how to inform policy design, and encourage long-term behaviour change.

**Recommendations:**

- Clarifying the purpose of the project is essential to give it meaning and ensure a legacy for the work and the Living Lab itself.

- Develop a plan for user testing and iteration of the product or service thereby moving it up the technical readiness levels (TRL).

- Put people into the impact assessment process. Think about how to measure whether the Living Lab is making an impact on people's lives.

- Collaborate with potential users to ensure the interventions are meaningful to people's everyday lives.

- Engage with policymakers to understand their issues and processes, and in doing so, enable the Living Lab to show how they can support them to become more proactive.

- Engage with decision-makers.Once onboard it will be easier to implement new strategies and policy recommendations.

# The iSCAPE Living Lab Game

Serious gaming and game theory are great ways to stimulate collaboration, deal with societal challenges and raise awareness about contemporary environmental challenges in a creative and engaging way.

# Introduction and function of games

We used the Lego serious play approach at workshops to generate ideas and share learning throughout the iSCAPE project. In collaboration with SISCODE, the iSCAPE team delivered a Lego Serious Play workshop at the Open Living Lab Days conference. The topic was "How to Living Lab" and "Why Living Labbing?"

In these sessions participants' explored different situations in relation to their Living Lab through Lego bricks. Another game iSCAPE explored was the UnALab urban Living Lab playground game. This uses storytelling to create empathy about environmental challenges among various stakeholder groups.

We believe that games have the potential to fulfil different functions. They are a great way to bring stakeholders from different backgrounds and expertise together to work through challenges in a playful way. Depending on their structure, games can reveal important processes and mechanisms for Living Labs. The aims and rules demonstrate potential consequences, risks and barriers. Two approaches are particularly relevant in the context of Living Lab activities.

Games can be broadly defined as: "Experimental, rule-based, interactive environments, where players learn by taking actions and by experiencing their effects through feedback mechanisms that are deliberately built into and around the game" [5]

## 1. Learning through playing

- Gaining certain knowledge and skills (eg, training teams on Living Lab methods and air quality challenges).

- Using games for testing ideas and solutions such as regulations and policy change.

## 2. Learning through storytelling

- Creating empathy for specific situations and issues.

- Communicating ideas and problem areas.

- Making complex things more tangible for a non-expert audience.

5. Mayer I.S 2009, The gaming of policy and the politics of gaming: A review. P.825-862.

# Why did we develop the iSCAPE Living Lab game?

As our project comes to an end, we developed the iSCAPE Living Lab Game to communicate our learnings, methodologies, the individual Living Lab stories and, of course, to have some fun. The game is an engaging summary of the many informative reports we created over the last few years, and will hopefully help you and other players to understand the iSCAPE project in a playful way.

## Game development

The beta version of the iSCAPE game was developed by our colleagues at the Future Cities Catapult, an iSCAPE delivery partner. The game development process started with a best practice review of existing games such as the policy board game **Innovate!**[6](Nesta) and **₹ubbish!**[7] (Fields of View), a game designed to promote sustainable waste management practices.

In order to maintain the game's development pipeline, the following criteria was always considered throughout the process:

- **Target audience.** For us it was clear that the game should be accessible to experts as well as people new to the Living Lab concept and the challenges of air quality and climate change.

- **Discussion and debate.** We want to catalyse discussions, stimulate new ideas, and demonstrate the value of multi-stakeholder collaboration.

- **Simple and visual.** Easy to grasp graphics that quickly communicate ideas. We wanted to create a tool that helps players explore the complex nature of Living Labs and develop an understanding of not just how they are set up, but also how they behave.

- **Sharing is caring.** The ultimate goal of the game is not to reinvent the wheel, but to share our iSCAPE learnings and empower players to make urban environmental challenges visible.

Some of the unexpected but practical issues we had to address during the prototyping included:

- The actual **structure** of the game and how to incentivise players to return to it several times.

- The **materials and design**.

- The question of giving the game a **competitive element** without undermining collaboration.

We changed the structure many times and it is important to note that the iSCAPE Living Lab game is still in its early stage. The first iteration session will be at iSCAPE's the final iSCAPE event in Dublin on the 8th November 2019 where we will test the beta version of the game together with Living Lab partners and attendees.

We will use the feedback from this event to work on the next version and share a downloadable link/file on the iSCAPE website soon after. Stay tuned!

6. http://fieldsofview.in/projects/rubbish/
7. https://www.nesta.org.uk/blog/playtesting-innovation-policy-board-game-igl2018/

# The iSCAPE Living Lab Game

Your mission is to tackle **air pollution** and **climate change challenges**. The game has been designed for up to **six players**, who are invited to immerse themselves in one of the **six iSCAPE Living Labs** in Bologna, Bottrop, Dublin, Guildford, Hasselt and Vantaa. Players need to guide all of their four Living Lab stakeholder groups – **academia**, **citizens**, **government** and **industry** – throughout their journey of tackling the air quality challenges. To win, a Living Lab has to ensure that all of its four stakeholders reach the iSCAPE Living Lab base first.



8. Download the game here: https://www.iscapeproject.eu/the-iscape-living-lab-game/
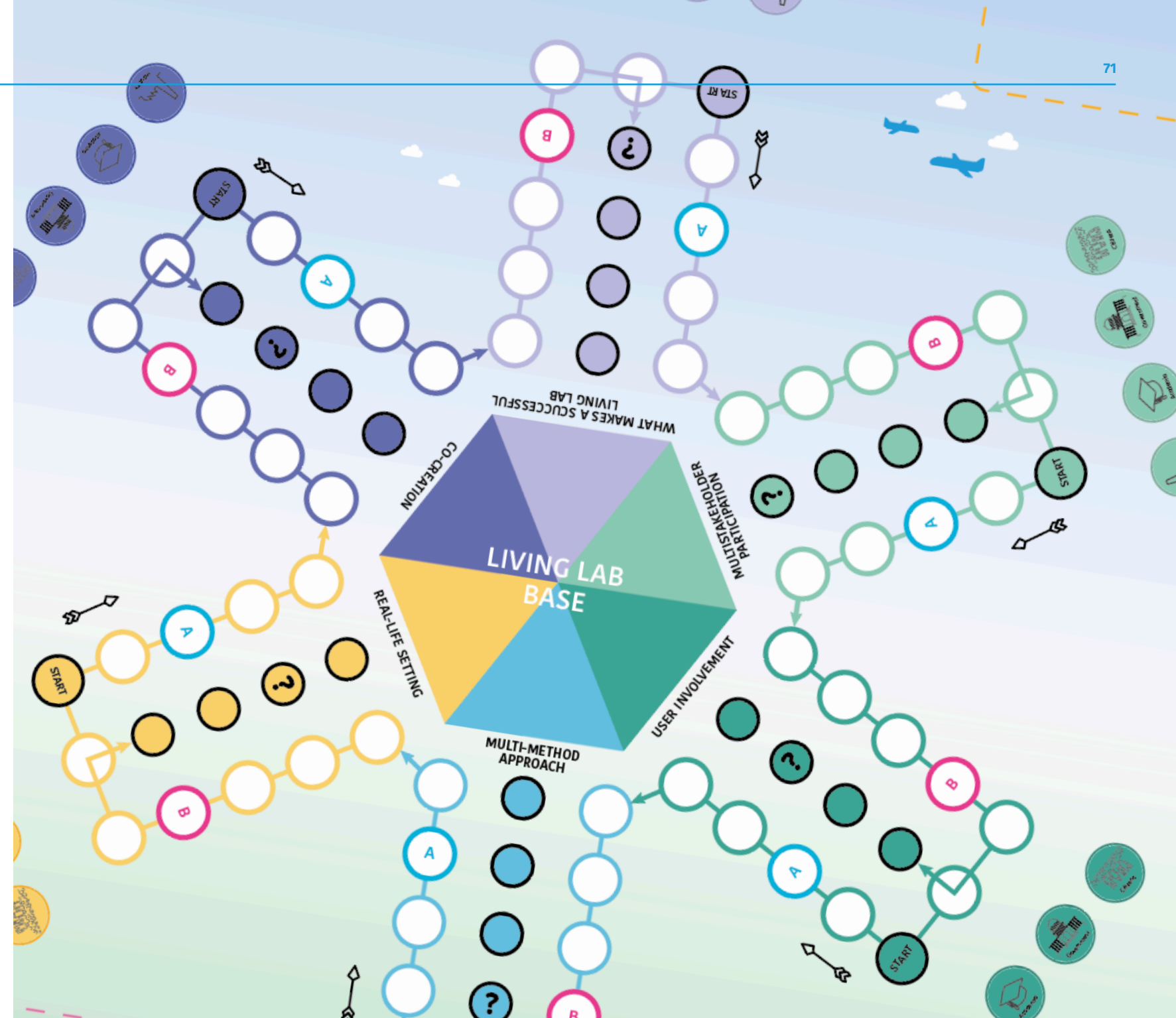
# The rules

- Up to **six players** can take part in the game. At the start, each player draws a Living Lab card and reads it out loud. From now on the player plays from the perspective of this Living Lab and represents its goals and objectives.

- **Each player has four game pieces** – one for each of the four stakeholder groups of a Living Lab (academia, citizens, government and industry). At the beginning of the game the game pieces are placed in the 'city area' outside the 'Living Lab journey area.

- Players throw a dice to move their game pieces. **A game piece can only go to the 'start'** position on the 'Living Lab journey area' **if a player throws a six.**

- From now on, the players move any of their pieces on the field by the number shown on the dice. If a player throws **a six, she/he has the opportunity to throw the dice again. If there are no game pieces to be taken o**ut to the 'Living Lab journey area, one of the pieces is moved by the sum of the two throws.

- If a Living Lab's game piece moves to a **section already taken by another Living Lab's game piece**, the player rolls the dice again and **both pieces move forward** by the number on the dice.

- Along the 'Living Lab journey area' there are **some opportunities and hurdles.** If your Living Lab game piece lands on them, **you need to take a card from the respective card deck**, read it out loud and follow the guidance.

- Once one of the four game pieces is in the final five steps of the 'Living Lab journey area', **the player needs to throw a dice with the exact number of steps to move to the 'iSCAPE Living Lab base'.** If the game piece lands on a **question mark the player needs to answer a question correctly** to move forward and reach the base. If the player fails, the game piece remains at its position and the usual rules for the final five steps apply.

- **The first player to get all four of their Living Lab stakeholders into the 'iSCAPE Living Lab base' wins.** Congratulations! Your Living Lab has successfully achieved its goal and raised awareness about environmental issues in their city.

# Here is the game:

# Have Fun!

**Download the game cards here:
https://www.iscapeproject.eu/the-iscape-living-lab-game/**

iSCAPE