



Exploitation Strategy

D7.1

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Table of Contents

1	Executive Summary	- 8 -
2	Introduction	- 9 -
2.1	iSCAPE Exploitation Roadmap	- 10 -
2.2	iSCAPE Exploitation Objectives	- 14 -
3	Exploitable Foreground	- 16 -
3.1	iSCAPE Exploitable Foreground	- 16 -
3.2	Exploitation Target Groups	- 20 -
3.2.1	Potential Commercial Exploitation	- 22 -
3.2.2	Potential Political Exploitation	- 23 -
3.2.3	Potential Scientific and Educational Exploitation	- 23 -
3.2.4	Potential Societal Exploitation	- 24 -
3.3	Business/Mission Model Canvas	- 24 -
4	Fields of Exploitation	- 26 -
4.1	Technology Readiness Levels	- 26 -
4.2	Partner Perspectives	- 29 -
4.2.1	Academic Institution	- 29 -
4.2.2	Intermediary Organisations	- 30 -
4.2.3	City Councils (DCC)	- 31 -
4.2.4	SMEs	- 32 -
5	Five Opportunities for Exploitation	- 34 -
5.1	A European or Governmental Resource for Air Quality and Climate Change Mitigation	- 35 -
5.2	iSCAPE Smart Citizen Approach Towards Smart Cities	- 36 -
5.3	iSCAPE as a Basis for Further Scientific Research	- 37 - 5.4
	iSCAPE as an Educational Concept	- 39 -
5.5	iSCAPE as a Social Enterprise, Improving the Quality of Life in Europe	- 39 - 6
	IPR and Commercialisation	- 41 - 7
	Conclusion	- 42 -
8	Annex	- 43 -
8.1	Business Model Canvas	- 43 -
8.1.1	Consolidated BMC/MMC	- 45 -
8.2	Project Results Mapping Tool Created by the Consortium	- 53 -
9	References	- 54 -

List of Tables

TABLE 1: ISCAPE'S WP7 - OVERVIEW OF EXPLOITATION STRATEGIES	- 12 -
TABLE 2: ISCAPE'S EXPLOITABLE ROADMAP	- 15 -
TABLE 3: ISCAPE'S EXPLOITABLE RESULTS	- 20 -
TABLE 4: ISCAPE'S KEY END USERS AND STAKEHOLDERS	- 22 -
TABLE 5: TECHNOLOGY READINESS LEVELS (SOURCE: CONTACT OFFICE FOR EUROPEAN RESEARCH INNOVATION AND EDUCATION)	- 27 -
TABLE 6: TARGET AUDIENCES AND POTENTIAL OPPORTUNITIES FOR ISCAPE'S KERs.....	- 34 -
TABLE 7: ISCAPE AS A EUROPEAN OR GOVERNMENTAL RESOURCE FOR AIR QUALITY AND CLIMATE CHANGE MITIGATION - KERs AND TARGET AUDIENCES	- 35 -
TABLE 8: ISCAPE SMART CITIZEN APPROACH AS AN IMPLEMENTATION TOOL TOWARDS SMART CITIES - KERs AND TARGET AUDIENCES	- 36 -
TABLE 9: ISCAPE AS BASIS FOR FURTHER SCIENTIFIC RESEARCH - KERs AND TARGET AUDIENCES	- 38 -
TABLE 10: ISCAPE AS AN EDUCATIONAL CONCEPT - KERs AND TARGET AUDIENCES	- 39 -
TABLE 11: ISCAPE AS A SOCIAL ENTERPRISE - KERs AND TARGET AUDIENCES	- 40 -

List of Figures

FIGURE 1: EXPLOITATION STRATEGY ROADMAP	- 13 -
FIGURE 2: BUSINESS MODEL CANVAS TEMPLATE VIA HTTPS://CANVANIZER.COM	- 43 -
FIGURE 3: PROJECT RESULTS MAPPING TOOL	- 53 -

List of abbreviations

AB	Advisory Board
ARPAE	Regional Agency for Prevention and Environment of Emilia - Romagna (Italy)
BMC	Business Model Canvas
CSR	Corporate Social Responsibility
DCC	Dublin City Council
EC	European Commission
ENoLL	European Network of Living Labs
EU	European Union
FCC	Future Cities Catapult
FMI	Finnish Meteorological Institute
GA	Grant Agreement
IAAC	Institute for Advanced Architecture of Catalonia
IPR	Intellectual Property Rights
IT	Information Technology
JRC	Joint Research Centre
KER	Key Exploitable Results
LL	Living Lab
MMC	Mission Model Canvas
NGO	Non-governmental organisation
OECD	Organisation for European Economic Co-operation
OLLD	Open Living Lab Days
PCS	Passive Control Systems
PURETI	Nanoair Solutions
SME	Small and Medium Enterprise
T6	T6 Ecosystems
TCD	Trinity College Dublin
TRL	Technology Readiness Level
TUDO	Technical University Dortmund
UCD	University College Dublin
UH	Hasselt University

UNIBO	University of Bologna
UoS	University of Surrey
WP	Work Package

1 Executive Summary

Exploitation strategies are needed to capitalise knowledge and technology developed throughout the lifespan of the iSCAPE project and to bring value generated to both market (from a business perspective), and society (from an educational, scientific, political and societal perspective). This deliverable presents iSCAPE's key exploitable results and identifies potential fields for exploitation beyond the end of the project. It explores the opportunities emerging for the wide range of outputs and recognises how these can be further developed to promote higher air quality and sustainable city usage. In addition, it liaises the lessons learnt with regulatory consequences concerning population exposure and furnishes expert advice which could ultimately be deployed towards the creation of healthier cities.

This Exploitation Strategy outlines **the potential and opportunities for commercial, political, scientific, educational and societal exploitation of the iSCAPE foreground methods and tools** (e.g. evidence-based data, scientifically validated research, real-life testing, etc.) and identifies ways **to maximise the impact of iSCAPE across key stakeholder groupings** (e.g. policymakers, cities, urban planners, etc.). This overall assessment's objective is to answer the questions:

- *What are the key exploitable project results and what is their exploitation and replication potential?*
- *How has the iSCAPE project succeeded in developing technical solutions to improve air pollution management?*
- *What further efforts are required to enhance the key exploitable results to date?*

This deliverable uses an inclusive methodology and employs iSCAPE exploitable results mapping tool and the consolidated insights delivered from individual project members through Osterwalder's Business Model Canvas (Osterwalder et al., 2010) and Blank's Mission Model Canvas (Blank, 2016). These strategic tools assisted in outlining the results of the project comprehensively and summarised their value proposition to both internal and external stakeholders. As a consequence, five emerging themes were identified and were presented as future exploitation opportunities. They were analysed in a pragmatic manner and were matched to relevant target groups. The five opportunities are:

1. iSCAPE as a European or Governmental resource for air quality and climate change mitigation;
2. iSCAPE as a Smart Citizen Approach towards smart cities;
3. iSCAPE as a basis for further scientific research;
4. iSCAPE as an educational concept;
5. iSCAPE as a Socials Enterprise, improving the quality of life in Europe.

The report encompasses the different aspects of iSCAPE outcomes and illustrated how they could affect not only markets, but also political, societal and educational groups, and ultimately, to deliver value to general civil audiences.

2 Introduction

This Exploitation Strategy recognises the social entrepreneurship of the iSCAPE project and aims to delineate the various ways that the project results can be commercialised and innovatively utilised for the betterment of European society. The priorities in this regard are making the iSCAPE results readily available for key end-users by the end of the project. The iSCAPE project's objective is to integrate and advance the control of air quality and carbon emissions in European cities through the development of sustainable and passive air pollution remediation strategies, policy interventions and behavioural change initiatives. The vital concern of air pollution in the context of climate change is addressed through an innovative approach using “Passive Control Systems”¹ in urban spaces. iSCAPE has established six Living Labs in selected cities in Europe (Dublin, Bologna, Hasselt, Guildford, Bottrop, and Vantaa) assessed for future climate change scenarios and representative of different climate zones, cultures and lifestyles in Europe. By applying real-world physical interventions on the urban tissue, iSCAPE promotes the use of low-cost sensors and evaluates the expected benefits on a neighbourhood and city-wide scale for several aspects ranging from quantification of pollutant concentration to exposure.

iSCAPE encapsulates the concept of “smart cities”² by advocating for citizen engagement and for sustainable urban development to be achieved by sharing the project's results with policymakers and planners and by providing scientific evidence and ready-to-use solutions, potentially leading to real-time operational interventions. This integrated approach aims at helping to establish more resilient, healthy, and sustainable cities, by bringing together theory from engineering, climatology, physics, urban planning, public policy, urban and environmental sociology, urban geography, and human-centered design through thoroughly developed exploitation and market penetration strategies.

The need for these results is undeniably acute. Poor air quality continues to cause severe health and environmental problems. According to the World Health Organization (WHO), in 2016 more than 550 000 deaths were attributed to the joint effects of household and ambient air pollution in the European region³, with the most common sectors contributing

¹ Passive Control Systems do not require any active actions by citizens: they are objects that affect the dispersion of pollutants and allow for engineering the wind flow in a city at street or neighborhood level.

² A smart city is a place where traditional networks and services are made more efficient with the use of digital and telecommunication technologies for the benefit of its inhabitants and business. Definition provided by the European Commission: https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities-and-urban-development/city-initiatives/smart-cities_en

³ World Health Organisation, Beat air pollution to protect health: World Environment Day 2019: <http://www.euro.who.int/en/health-topics/environment-and-health/air-quality/news/news/2019/6/beat-air->

to high air pollution in European countries being agriculture, energy, transport, industry, commerce, and waste.

To take corrective actions towards improving air quality, the European Commission adopted in 2013 a Clean Air Policy Package⁴, including a Clean Air Programme for Europe setting objectives for 2020 and 2030, and accompanying legislative measures which the Member States have been adopting to ensure that amendments were made. As a result, local municipalities have initiated the introduction of clean technologies in industry and renewable power sources, the adoption of improved waste management, the enhancement of urban planning (e.g. new cycling lanes, prioritized public transportation, interurban rail travel, green walls) and green cities initiatives (waste management, natural resource protection, alternative energy projects, forest restoration). There are clear differences between the level of air pollution in European countries and the timeframe and management of addressing these issues, combined with countries' willingness to deploy smart solutions and learn from these. Differences are mainly due to the characteristics of the countries concerned (population, the use of clean technology in industry, waste management, green urban planning, etc.). The differences in approaches seem to be slowly converging due to the European Commission's legislative measures towards reducing air pollution and substitute toxic sources with greener initiatives. The efficacy and practicality of actions are critical for our quality of life and concrete, evidence-based solutions are needed to address these issues in a timely manner. Air pollution is also directly linked to climate change, as the greenhouse gas emission is both a significant source of pollution, as well as a key driver to climate change. Limiting global warming requires decisive action against air pollutants and comprehensive scientific research to understand the effects of emission sources and how can those be mitigated.

The knowledge and technology generated by the iSCAPE project are expected to be valuable for local municipalities and different levels of policymakers, which, as a result, will be highly beneficial to larger-scale groups, or namely citizens. The project also incorporates educational and behavioural change elements by promoting the engagement of the general public and raising awareness through co-creation and citizen science activities. The immediate output of this research & innovation (R&I) action consists of a series of scientific and technical reports, combined with evidence-based trials and development of low-cost sensors demonstrating the impacts on local air quality. In addition, follow-up efforts (i.e., after the completion of the project) will focus on the deployment of results in different contexts through collaborations with relevant authorities to assist the aspirations behind smart cities initiatives.

2.1 iSCAPE Exploitation Roadmap

Exploitation is a specific term for the Horizon 2020 Programme and refers to the use of results produced in an EU project in further activities, such as developing, creating and

⁴ European Commission, Environment: https://ec.europa.eu/environment/air/index_en.htm

marketing a product, process or service, standardisation activities, and other research activities⁵.

The Exploitation Strategy is a plan containing the definition of target groups, user requirements, the activities each partner in the Consortium is committed to carrying out, how the project's results will be exploited, and ultimately used by principal beneficiaries and end-users. It explores the potential for future development and implementation of iSCAPE's results and identifies the Key Exploitable Results (KERs) which can be used in target markets, legislative and educational contexts.

This Exploitation Strategy was developed as part of a larger work package (WP) dedicated to project result exploitation (WP7). The current report is part of Task 7.1 "Establish the approach for exploitation and cooperation with related initiatives and stakeholders" and was developed in three iterations, one at the beginning of the project, one mid-project, and one at the end of the project. The first two were conducted by JRC, whereas UCD led the final version culminating in this report. The three iterations follow iSCAPE's development and integrate the Key Exploitable Results throughout the project's advancement. This approach provides an overarching plan for both project-wide exploitation activities and individual exploitation efforts by identifying exploitable project results, their application areas and geographical coverage/market.

WP7 was designed to both generalise outcomes across the project and to explore individual paths of exploitation (done through Tasks 7.2 - 7.5) and based on contractual obligations defined by the Grant Agreement (GA). GA Article 28 *Exploitation of Results* stipulates that each beneficiary must take measures to ensure that either direct or indirect exploitation of results by "1) *using them in further research activities (outside the action)*, 2) *developing, creating or marketing a product or process*, 3) *creating and providing a service*, or 4) *using them in standardisation activities*". The individual exploitation activities are designed to increase the impact of iSCAPE's results so that partners can directly exploit them or facilitate exploitation by others. For more detail, please consider the table below:

TASK	OBJECTIVES
T7.1 Establish the approach for exploitation and cooperation with related initiatives and stakeholders	Aims to develop the tools and establish an effective way to exploit the project results within and beyond the life of the project and to translate it into an exploitation plan with industrial partners and regulatory authorities.
T7.2 Generalised solutions for urban	Aims to comprehensively summarise the key findings on the infrastructural interventions such as physical PCs,

⁵ European Commission Funding and Tender opportunities (Glossary) <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/support/glossary>

infrastructure and related decision-makers	green infrastructure, photocatalytic coatings and urban design considerations, and develop associated policy guidelines for the urban decision makers.
T7.3 Behavioural recommendations for urban anthropogenic activities to population exposure and human health	Summary of the new traffic assignment model providing new insights on how traffic policy measures need to be designed to improve environmental quality. The report also includes the usage of emission models to estimate traffic related emissions, dispersion models to estimate concentrations at which people are exposed and exposure and health impact models to estimate the environmental impacts on public health.
T7.4 Roadmap of deployment project technological innovations to the market	Summary of iSCAPE's interactions with industry in order to explore the preliminary requirements and with regulatory authorities that will act as end-users for utilising project's key deliverables.
T7.5 Exploit the lesson learnt from Living Labs as an innovation instrument for sustainable air quality improvement	Aims to collect the knowledge developed through the project in relation to Living Labs as an instrument to develop interventions for air quality improvement and to curate educational materials in the format of webinars, podcasts, tailored workshops and attractive reports/ guidebooks/policy briefs to support wider adoption in Europe and world-wide.

Table 1: iSCAPE's WP7 - Overview of Exploitation Strategies

This report covers several aspects: Key Exploitable Results (KERs), Key Target Groups, Exploitation Perspectives, Exploitation Opportunities, and Intellectual Property Rights (IPR). To achieve this, the Exploitation Strategy draws upon an extensive project results' mapping and the Business Model Canvas (BMC)⁶, a strategic management template which assists in documenting both individual and consolidated approaches towards iSCAPE's exploitable results. The flowchart below illustrates the steps taken for the development of the Exploitation Strategy. It uses as a starting point iSCAPE's exploitable results mapping, which was carried out collectively by all the members of the Consortium. The KERs are then linked to specific target groups (previously recognised as relevant to the project by iSCAPE's Communication and Dissemination Strategy (D8.1)⁷), and

⁶ More information about the BMC can be found in the Annex Section of this document.

⁷ Available at the project website: <http://iscapoproject.eu/>

potential commercial, political, scientific and educational, and societal impacts are presented as a foreground for the five specific opportunities for future exploitation. These are further embellished by partners' perspectives, presented in a consolidated manner, through the Business Model Canvas.

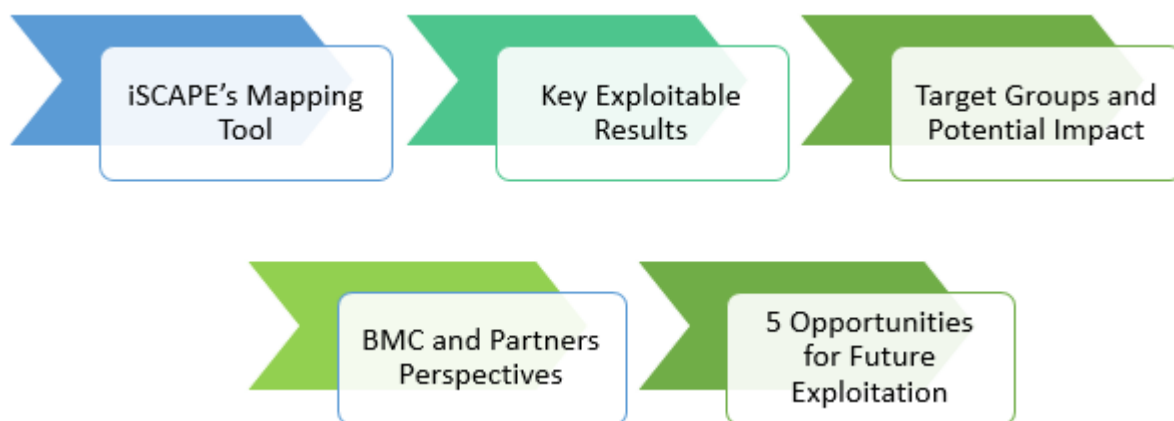


Figure 1: Exploitation Strategy Roadmap

The Exploitation Strategy uses a participatory methodology: all members of the Consortium have worked closely together to identify and outline the project's KERs and have populated their individual BMC templates, which then have been consolidated to extract the major trends per group. Adopting this approach strengthens the analysis and ensures that an agreement amongst the partners is achieved. In addition, iSCAPE's Advisory Board (AB) facilitated dissemination and exploitation activities by identifying additional channels and stakeholders to enhance the impact of project outcomes, for instance Dr. Hans-Guido Mucke helped publish project-related information in the WHO newsletter. The AB also fostered synergies between different projects, which ultimately resulted in another Horizon 2020 project on citizen science⁸ activities using low cost air quality sensors and traffic monitors. The WeCount project is part of the 'Science with and for Society' (SwafS) programme and will focus on citizen science activities around the theme of air pollution in several European Cities.

This deliverable is interlinked with the Communication and Dissemination Strategy(D8.1) and the Data Management Plan (D3.2) ⁹ , as it addresses knowledge sharing and awareness-raising, and delineates how research data will be made available throughout and after the project's end. These two aspects play a critical role in the overall Exploitation

⁸Citizen Science refers to the general public engagement in scientific research activities when citizens actively contribute to science either with their intellectual effort or surrounding knowledge or with their tools and resources.

⁹ Both reports are available at the project website: <https://www.iscapeproject.eu/results/>

Strategy by incorporating distribution channels and deployment and the results' sustainability through active stakeholder engagement, innovation and data management.

Furthermore, the Exploitation Strategy is a plan which defines a framework, and outlines the legal actions needed to exploit the results of the project to regulate the relationship among all the partners of the Consortium, including IPR considerations. The project's methodology allows for members of the Consortium to be engaged in different exploitation activities aimed not only to inform stakeholders but to help identify specific target groups which may employ iSCAPE's results in a manner resulting in significant societal benefits.

2.2 iSCAPE Exploitation Objectives

iSCAPE's goals consist of developing and evaluating an integrated strategy for air pollution control in European cities grounded on evidence-based analysis by focusing on 3 distinct areas:

- **Research:** Throughout the iSCAPE project, high-level environmental research has been carried out by the partners of the Consortium, and a large number of technical reports have been produced and scientific publications have been published in peer-reviewed journals. In addition, a great variety of outcomes were produced to widen societal impact and to raise awareness amongst children and students, as well as the general public.
- **Sensor Development:** Citizen Science through sensing technology has been developed by IAAC, and consists of hardware and software components, which aim at maintaining and collecting data of low-cost and high-end environmental sensor solutions.
- **Living Lab Activities:** Six Living Labs were set up to connect a great variety of stakeholders around the challenge of co-creating ad-hoc real-time interventions to advance air pollution remediation strategies and solutions. They also increased the engagement of citizens (co-creation & citizen and stakeholder engagement were at the core of LL activities), and by doing so, they increased the public awareness of air pollution control.

In addition to iSCAPE's contribution to knowledge, its framework focuses on two groups of interventions aimed at affecting air pollution dispersion by deploying Passive Control Systems (PCSs) and at reducing emissions by promoting behavioural change. The PCSs include low boundary walls, trees and hedge-rows, green walls and roofs, photocatalytic coatings, green urban spaces and road geometry interventions designed for each test case, as cities have specific urban landscape and climate characteristics. The behavioural change interventions set aims at promoting a shift in transport mode choices and activity patterns, which lead to more sustainable city usage. These insights could then be used as a means of calculating the impact of different policy scenarios on air pollution and exposure in addition to estimating the economic benefits of PCSs. Integrating societal processes with technical solutions is vital for the overall successful implementation of this action plan.

iSCAPE's exploitation objectives focus on identifying worldwide developing areas where the project results will provide cutting-edge expertise and will maximise the overall outcomes in the field of air quality and climate change. It also aims at establishing a framework for exploitation by outlining the actions needed to exploit the results of the project and by regulating the relationship among all the partners of the Consortium, which includes Intellectual Property Rights (IPR).

The strategy was built upon an initial draft of the exploitation plan included in the GA, which considered different aspects. For the purposes of iSCAPE's exploitation, the GA differentiates between technical/technological outputs, research deliverables, and deliverables with commercial value. The exploitable results are then linked to specific paths of exploitation, including scientific, educational, societal, political and commercial prospects, and how they can be used to maximise iSCAPE's impact. These are further explored in the subsequent section.

EXPLOITABLE RESULTS	EXPLOITATION ROADMAP
Technical/Technological Outputs	Positive impact on air quality in cities - To define a framework to exploit the lessons learnt from the innovative use of Passive Control Systems and behavioural change initiatives in urban environments in order to deploy similar interventions in other cities in the EU and worldwide.
Outputs with Commercial Value	Ensure market uptake of innovative solutions - To define business scenarios considering each SME of the Consortium in terms of commercial positioning and products/services already offered, as well as a suitable value chain for the implementation of applications.
Scientific Outputs	Translate findings into policy actions - To define a pragmatic procedure to translate the findings into policy actions in order to maximise the impact. Contribution to knowledge - To define a framework to exploit the lesson learnt from the innovative use of Living Labs in the field of air quality in order to further exploit the gathered knowledge as part of future EC projects and export the learnt lesson to developing countries

Table 2: iSCAPE's Exploitable Roadmap

3 Exploitable Foreground

Foreground means the results, including information, materials and knowledge, generated in a given project, whether or not they can be protected. It includes intellectual property rights (such as rights resulting from copyright protection, related rights, design rights, patent rights), similar forms of protections (e.g. sui generis right for databases) and unprotected knowhow (e.g. confidential material). Thus, foreground includes the tangible and intangible intellectual property results of iSCAPE. Results generated outside a project (i.e. before, after or in parallel with a project) do not constitute foreground. Results generated in parallel with a project are often informally referred to as "sideground".

The iSCAPE project has built upon feedback and challenge of key stakeholders to deliver various end products, or 'exploitable foreground'. The exploitable foreground for iSCAPE incorporates all these results that can be deployed past the life of iSCAPE, and which can be utilised to assure an improved outlook for European cities in terms of air pollution and climate change. In addition, the organisational processes, trainings and insights are valuable outputs with exploitation potential for each of the project partners.

3.1 iSCAPE Exploitable Foreground

The iSCAPE project delivered a wide range of results, which have collectively been mapped by all the members of the Consortium and summarised in the table below. The template¹⁰ was used by project partners to identify all the outcomes from the project, and was used as a starting point of analysis for what constitutes iSCAPE's exploitable foreground.

iSCAPE EXPLOITABLE RESULTS	
Type of Result	Description
Algorithms	iSCAPE has produced several algorithms as part of its research activities and during the sensor development. These include, for example, an algorithm to isolate the effect of trees on ventilation and air pollution removal by exclusion of the other known factors (such as traffic flux, geometry, and background wind magnitude and direction) affecting these phenomena in real urban street canyons produced by UNIBO, and algorithms produced by IAAC as part of the Sensor Analysis Framework, described and publicly available online ¹¹ .

¹⁰ The template created and used by the Consortium can be found in the Annex Section of this document.

¹¹ <http://docs.smartcitizen.me/Sensor Analysis Framework/guides/Install the framework/>

Educational Material & Concepts	<p>In addition to high-level scientific publications and technical reports made available, iSCAPE has produced educational materials to support innovative educational concepts, that can be used to raise awareness and introduce a pro-environmental mindset in schools. The Air We Breath booklet¹² (including animated videos) for school children was produced by Dublin Living Lab to explain the project. In addition, a comic book is being produced as a means of engagement with children, describing them as superheroes fighting against air pollution monsters.</p> <p>Pro-environmental education concept of a school lesson about trees was carried out as part of the co-creation activities for the Wandering Trees Parade 2019 (Bottrop Living Lab). The concept was first tested in a local primary school in May 2019, and then replicated in another local school in June 2019 and it increased children awareness of air pollution.</p>
Guidelines/Guide	<p>Project experiences and learnings have led to the production of several guidelines and guides. These include:</p> <ul style="list-style-type: none"> • Experiences of ‘why to’ and ‘how to’ living lab have been described, for example, in The Living Lab Guidebook: For Cities Fighting Against Air Pollution (work led by ENoLL). • The Citizen Science pack developed by FCC provides a set of guidelines for Living Labs and in general scientific communities to set up and implement workshops for citizen science. This was uploaded to the WeObserve Platform. • A number of step-by-step instructions and tutorials have been produced by IAAC and are made available for sensor users online¹³. These include guides on how to, for example, install Citizen Kits or onboard a new sensor to the Smart Citizen platform. • Research efforts of UoS have led to the development of a set of recommendations for green infrastructure - Implementing Green Infrastructure for Air Pollution Abatement: General Recommendations for Management and Plant Species Selection¹⁴.
Hardware	<p>As part of the iSCAPE Sensor Development activity, hardware</p>

¹² <https://www.yumpu.com/en/document/view/62191692/the-air-we-breathe>

¹³ <http://docs.smartcitizen.me/>

¹⁴ [http://epubs.surrey.ac.uk/852553/1/Pollution Abatement v7 - FINAL VERSION.pdf](http://epubs.surrey.ac.uk/852553/1/Pollution%20Abatement%20v7%20-%20FINAL%20VERSION.pdf)

	tools were produced to support bottom-up and smart environmental monitoring applications. Living Lab Stations and the Citizen Kit are released using open source licenses (CERN and GPL) ¹⁵ .
Knowledge and skills	Learnings and knowledge of the project Living Labs have been shared, for example, with a larger Living Lab community as part of the annual gathering of global Living Lab community - Open Living Lab Days (OLLDs). During the course of the project, iSCAPE partners delivered several workshops as part of the OLLDs (2017-2019). For example, a Citizen Science Workshop during OLLDs 2019 was organised to share the experience from the six Living Labs and demonstrate the learn the value and potential of the data they collected. An example of how the project knowledge can be exploited is Dublin Living Lab's collaboration with a large international NGO, who are interested in adapting the Living Lab's approach to working with children using Lego so that their approach can be replicated in schools across Eurasia.
Methodology/ method	Different methodologies were designed to support the needs of the project, which could be used as a foundation for further scientific advancement. These include: 1) Methodologies from research activities and simulation efforts, and 2) Living Lab ¹⁶ methodology and research steps.
Policy briefs	A set of policy briefs have been produced as part of Task 7.5 which is dedicated to delivering a knowledge and policy package. In total, nine policy briefs have been produced to introduce policy messages by linking the policy briefs to their intended audiences and summarizing key take-aways. These policy briefs focus on the project interventions, Living Lab efforts and sensor development.
Product	The Smart Citizen Kit 2.1 ¹⁷ is a complete set of modular hardware components aiming to provide tools for environmental monitoring, ranging from citizen science and educational activities to more advanced scientific research (developed by IAAC).

¹⁵ [https://docs.smartcitizen.me/Smart Citizen Station/](https://docs.smartcitizen.me/Smart%20Citizen%20Station/)

¹⁶

https://www.iscapeproject.eu/wp-content/uploads/2019/06/Collated_iSCAPE_Document_20190215_D2.5.pdf

¹⁷ [https://docs.smartcitizen.me/Smart Citizen Kit/](https://docs.smartcitizen.me/Smart%20Citizen%20Kit/)

Project reports & scientific publications	<p>During the course of the project a great number of deliverables were produced to capture project activities and outcomes. Research results were also used to produce a great number of peer-reviewed scientific publications¹⁸ which advance science by contributing to theory and knowledge in the field of air pollution control and management.</p> <p>iSCAPE papers have been published in, among others: Science of the Total Environment, Suitable Cities and Society, Environmental Pollution, Environmental Research, Environment International, Atmospheric Environment, Urban Climate, Journal of Environment Economics and Management.</p>
Prototype	<p>The Interactive Display System/ Air Quality Quiz¹⁹ (prototype designed and developed by FCC, IAAC, UoS) was created as a citizen awareness tool to provide specific information about air pollution and what can be done at an individual level as a preventive action.</p>
Recommendations	<p>A great number of recommendations for immediate use to city administrations or related experts on urban planning and interventions have been produced throughout the life of the project to assist sustainable city usage. An example is the <i>Generalized Recommendations Regarding Passive Control Systems for Improved Air Quality and Climate Change Mitigation</i>²⁰ (content of Deliverable 7.2 was reviewed by advisory board experts, associated partners and stakeholders in different cities for their formal feedback, which was then incorporated in the final version).</p>
Research data	<p>A considerable amount of research data has been produced throughout the life of the project, which could be broadly summarised into two categories:</p> <ul style="list-style-type: none"> • Observational and experimental data (e.g. environmental metrics gathered through the measurement campaigns, data collected using remote sensing stations, datasets of observational and experimental data); • Models and simulations (e.g. environmental, air pollution control and climate change simulation data, transport mobility models). <p>The data is available on Zenodo at: https://zenodo.org/communities/iscape/?page=1&size=20</p>

¹⁸ <https://www.iscapeproject.eu/journal-publications/>

¹⁹ <http://quiz.iscape.smartcitizen.me/>

²⁰ Published results can be found on iSCAPE website: <https://www.iscapeproject.eu/results/>

Software	Open Source Sensors Software Platform²¹ enable citizens to gather information on their environment and make it available to the public on the Smart Citizen platform. It is intended as a tool to learn and build on. It visualises environmental data, which is collected automatically and is made publicly available free of charge.
Engagement tools	All the tools that were developed throughout the project are available on the The Virtual Living Lab website²² , and is aimed at citizens and other iSCAPE stakeholders interested in improving air quality as well as architects, urban planners and developers of citizen sensors.

Table 3: iSCAPE's Exploitable Results

The results from the table expands on the three types of exploitable results listed earlier, namely technological outputs, research outputs, and outputs with commercial value, by outlining their main elements and providing a brief description of their functionality. The project's outcomes are expected to have multi-directional implementation and impact, which is reflected by this strategy.

As previously stated in Chapter 2, individual exploitation reports of the project partners provide an insight to key exploitable results by summarising key findings and recommendations for future deployment to key target audiences, as well as lesson learnt throughout the life of the project. These deliverables include infrastructural recommendations (T7.2), behavioural recommendations (T7.3), technological innovations (T7.4), and Living Labs experiences (T7.5). As a result, this report combines information from individual partners and cross-references it with other deliverables produced by iSCAPE as a mean to adopt a comprehensive approach towards the project's outcomes and illustrates which fields for exploitation are being taken by members of the Consortium towards other stakeholders. Subsequent sections focus on the key target groups and consolidated perspectives from partner groups overlooking concrete future plans for development and implementation of iSCAPE's key exploitable results.

3.2 Exploitation Target Groups

iSCAPE uses an inclusive approach and operates with an extensive multidisciplinary network of partners as part of the Consortium. The project's methodology was designed to reflect the complexity of the challenge that it was set out to tackle; indeed, engaging with a broad range of stakeholders is vital to ensure the market penetration of the project's results and their successful implementation past its lifespan. The exploitation target groups and customers of the iSCAPE outcomes are city councils and local municipalities,

²¹ <https://smartcitizen.me/>

²² <https://docs.smartcitizen.me/>

¹⁹ <http://quiz.iscape.smartcitizen.me/>

²⁰ Published results can be found on iSCAPE website: <https://www.iscapeproject.eu/results/>

governmental entities and institutions (both national and regional), public organisations, SMEs, non-governmental organisations, universities, and research centres. The key end-users and target groups for the project have been identified in alignment with iSCAPE's Communication and Dissemination Strategy (D8.1). An overview of these groups is outlined in the table below:

iSCAPE TARGET AUDIENCES		iSCAPE EXPLOITATION OPPORTUNITIES	
Policy audience			
Policy makers – local level		To enable their diffusion into political directives and actions. Research findings could be used as a European or Governmental Resource for Air Quality and Climate change Mitigation (Chapter 5.1)	
Policy makers – national level			
Policy makers – EU level			
Regional, national or European Environmental Agencies			
City Councils and Local Municipalities			
Research audience			
Air quality, air pollution, climate change, urban sustainability researchers, universities, research institutes, scientific community		To generate and disseminate cutting edge research results to individual scientists and research networks on integrated strategies for air pollution control, considering climate change, and use iSCAPE Output as a Basis for further scientific research (Chapter 5.3) , and as an Educational Tool (Chapter 5.4)	
Research-driven science parks, networks, hubs and other EU-funded research projects			
Planning audience			
Architects, urban planners		Link with public administrations and private companies which are supporting the implementation of policies and plans in order to support a practical take-up of iSCAPE results and findings. More specifically iSCAPE Smart Citizen Approach as an implementation tool towards Smart Cities (Chapter 5.2) ;	
Companies and other organisations offering services for city planning, designing, administration			
Business audience			
Research-market oriented institutions		Work with industry to ensure commercial exploitation of project activities and innovative results and support the identification of business opportunities around passive air pollution control. Such opportunities include the development of iSCAPE Smart Citizen Approach as an implementation tool towards Smart Cities (Chapter 5.2)	
SMEs			
Private investors, e.g. Business Angels, venture capitalists, etc.			
Public business supporting agencies, e.g. Enterprise Ireland			
Civil Society			

¹⁹ <http://quiz.iscape.smartcitizen.me/>

²⁰ Published results can be found on iSCAPE website: <https://www.iscapeproject.eu/results/>

Citizens and Citizen Communities	Support knowledge sharing and raise awareness among the general public and citizens' organisations about integrated strategies on air quality and air pollution control in the cities, and by doing so use iSCAPE Smart Citizen Approach as an implementation tool towards Smart Cities (Chapter 5.2), and iSCAPE as a Social Enterprise, improving the quality of life in Europe (Chapter 5.5)
NGOs	
Living Labs dealing with smart city initiatives	
Innovation Labs dealing with urban sustainability, climate change and environmental protection	

Table 4: iSCAPE's Key End Users and Stakeholders

iSCAPE's results are multifold and are expected to have a significant impact on different target groups and stakeholders way beyond the life of the project. The following sections illustrate the potential roads to exploitation by linking them to the groups outlined in the table above.

The exploitation plans of project's results have commercial, political, societal or educational characteristics. They offer a wide range of future opportunities which can be directly exploited by members of the Consortium, or used by others, as all results are available under open licenses or are publicly available.

3.2.1 Potential Commercial Exploitation

iSCAPE uses a Living Lab, research-to-market approach, which was beneficial for the project in terms of facilitating the distribution channels and building on existing technological advances to deliver more sophisticated sensors and PCSs with high TRL levels (more detailed information will be found in Chapter 4.1).

The key stakeholders include not only the iSCAPE partners who have worked closely in the development of these products (e.g. IAAC, PURETI), but also other organisations, including research-market oriented institutions, SMEs, and public business support agencies. These organisations have the potential to support the key exploitable results of the project through commercialisation, to further develop them through customisation (or by offering consultations), and to promote higher-quality technological solutions for the sector. To date, the Smart Citizen Platform²³ has more than 7,000 registered users and the Smart Citizen Kit is sold directly via the Seeed Studio²⁴ online store and their distributors' network.

²³ Information available on the the Smart Citizen platform and Smart Citizen Kit here:
<https://smartcitizen.me/>

²⁴ Seeed is the biggest distributor worldwide of open hardware solutions with more than 200 local distributors. You can access the Smart Citizen Kit here:
<https://www.seeedstudio.com/catalogsearch/result/?cat=&q=smart+citizen>

¹⁹ <http://quiz.iscape.smartcitizen.me/>

²⁰ Published results can be found on iSCAPE website: <https://www.iscapeproject.eu/results/>

The use and development of technological advances addressing environmental concerns have the potential to affect citizens at large. They could be implemented by engaging with planning and civil audiences as a means to mitigate the effects of air pollution, and thus improve the overall quality of life.

3.2.2 Potential Political Exploitation

Throughout the course of the project, a significant number of deliverables were produced to capture project activities and outcomes, and to provide evidence-based data in the field of air pollution control and management.

iSCAPE has published different reports on the potentialities of public interventions, briefs and recommendations on physical infrastructure, and socio-economic assessments of air quality interventions. Some of the materials have already made their way to different departments and policymaking organisations. For example, the project publication on low-cost sensors for air pollution monitoring²⁵, has been included in Defra (UK) guidelines as a recommended read. The key stakeholders in this context include, but are not limited to, national and international policymakers and regional, national or European Environmental Agencies, as lead institutions which could influence and guide a change in the field, and help mitigate climate change through policy actions and recommendations.

3.2.3 Potential Scientific and Educational Exploitation

In addition to the production of both scientific and technical reports as mentioned before, iSCAPE partners have conducted several co-creation sessions with the public to raise awareness of urban air pollution. The results can be used as a basis for further discovery by air quality, air pollution, climate change, urban sustainability researchers, universities, research institutes, research-driven networks and the scientific community. Throughout the project's life collaborations and networking with other projects and initiatives have taken place including, but not limited to, the other Horizon 2020 projects (*Connecting Nature*, *OrganiCity*, *Making Sense*, *HackAir*, *SMURBS*, *UNaLab*, *U4IoT*, *EU-MACS*, *Synchronicity*, *TALIA*, *Grow Observatory*, *ROMI*, *CHIC*, *EUCalc*, *Climate-fit.city*), and initiatives through other funding schemes (*Noise Health*, *Noise Adapt*, *SPARKS project*, *A Playful city project*, *Cities as Living Labs*, *Climatestreet.fi*, *ERA4CS URCLIM*).

Project's outcomes and educational materials (e.g. [The Air We Breathe](#) ²⁶ booklet is readable online for free) have also been made publicly available and were distributed to some local schools in Ireland. Such initiatives have the potential to be deployed by National Education Departments in Europe, and to be used as an insightful tool for younger generations.

²⁵ DEFRA (UK), UK Air: <https://uk-air.defra.gov.uk/library/ageg/pollution-sensors/understanding-uncertainties.php>

²⁶ <https://www.yumpu.com/en/document/view/62191692/the-air-we-breathe>

¹⁹ <http://quiz.iscape.smartcitizen.me/>

²⁰ Published results can be found on iSCAPE website: <https://www.iscapeproject.eu/results/>

3.2.4 Potential Societal Exploitation

iSCAPE's results have the potential to improve quality of life by affecting the dispersion of air pollution and mitigating climate change. These goals have a critical societal impact not only at a European level but at a global one.

Setting up and managing the six iSCAPE Living Labs without previous experience in Living Lab operations constituted a significant challenge for the partners throughout the life of the project. The experience, however, has brought the most valuable insights and furthered the overall knowledge and expertise of this approach. The results have been shared with a broader Living Lab community as part of the annual gathering of the global Living Lab community - Open Living Lab Days (OLLDs). During the course of the project, iSCAPE partners delivered several workshops as part of the OLLDs ²⁷ (2017-2019). Project knowledge has not only been shared with other members of the community, but it has been further exploited by the Living Labs. One example is Dublin Living Lab's collaboration with a large international NGO, interested in deploying the approach for further educational tools for schools in Eurasia. Key stakeholders include but are not limited to, Living/Innovation Labs communities, organisations offering city planning, NGOs, city councils and local municipalities, and citizen associations.

3.3 Business/Mission Model Canvas

Determining potential individual exploitation strategies is a challenging task, particularly when referring to organisations which have no straightforward monetary objective, such as the purchase and sale/offer of goods and services for profit, but also contemplate the fulfilment of a given mission with an educational, societal or environmental scope. The distinction between these two key performance results makes it difficult to adopt the same approach across the iSCAPE Consortium partners because of different business models and definitions of value across industries and institutions. In order to concretise iSCAPE's plans for exploitation, and to ensure that those are linked to the project's exploitation objectives and target groups accordingly, this report uses both the Mission and Business Model Canvas as strategic management tools which helps to identify clear opportunities and pragmatic ways to approach them past the lifespan of the project.

The Business Model Canvas was deployed to depict the current position and exploitation strategy for partners of the Consortium, with their respective Key Exploitable Results (KERs), and to provide a comprehensive high-level overview of how they can be exploited in different markets and fields. As an instrument, it allows for an organisation to divide its processes into segments, each describing how value is created, captured and delivered in economic, social, cultural or other contexts. The template has a broad scope and has been mainly used by commercial organisations; however, it has been adapted for the purposes of research projects or other endeavours, whose objectives include a humanitarian pursuit by developing a Mission Model Canvas. The MMC uses the same

²⁷ DIY section of the guidebook was co-created with the Living Lab community:
<https://openlivinglabdays.com/2019/08/12/tips-and-tricks-for-living-lab-sustainability/>

¹⁹ <http://quiz.iscape.smartcitizen.me/>

²⁰ Published results can be found on iSCAPE website: <https://www.iscapeproject.eu/results/>

approach, but it adjusts those aspects which have a strictly commercial definition, such as revenue streams, cost structure and customer segments. In order to accommodate all the partners of the Consortium, and their respective work and roles within the projects, the report operates with both Business Model and Mission Model Canvases.

The two canvases are not dissimilar, and embody several categories which help to identify the KERs and position them within each partner's specific client and contact base. Therefore, each canvas provides individual members' perspectives and sustains iSCAPE's future opportunities for exploitation, discussed in the subsequent sections of this deliverable.

¹⁹ <http://quiz.iscape.smartcitizen.me/>

²⁰ Published results can be found on iSCAPE website: <https://www.iscapeproject.eu/results/>

4 Fields of Exploitation

iSCAPE is a multidisciplinary action plan, and as such, it offers a broad range of solutions which can be implemented to address acute environmental concerns, such as air pollution and climate change. This section's objective is to explore specific fields of exploitation which have been made explicit by the partners of the Consortium as avenues for the future development of the project's results. It also includes an assessment of the technological aspects of iSCAPE's outputs in compliance with the requirements of the Horizon 2020 framework. The two perspectives are critical for the overall understanding of iSCAPE's current position and were instrumental for the identification of the five exploitation opportunities, outlined in Chapter 5.

4.1 Technology Readiness Levels

In order to have a realistic grasp on the different Fields of Exploitation, the Technology Readiness Levels (TRL) must be unpacked to adequately evaluate and measure the technological aspect of the project. TRLs are widely understood in terms of product development and the following definitions are taken from the Horizon 2020 documentation²⁸. Where TRL levels are mentioned the following definitions apply, unless otherwise specified:

TRL 1 – basic principles observed

TRL 2 – technology concept formulated

TRL 3 – experimental proof of concept

TRL 4 – technology validated in the lab

TRL 5 – technology validated in a relevant environment (industrially relevant environment in the case of key enabling technologies)

TRL 6 – technology demonstrated in a relevant environment (industrially relevant environment in the case of key enabling technologies)

TRL 7 – system prototype demonstration in an operational environment

TRL 8 – system complete and qualified

TRL 9 – the actual system is proven in an operational environment (competitive manufacturing in the case of key enabling technologies; or in space)

The TRLs are then allocated to three separate groups²⁹, namely *concept development* (TRLs 1 -3), *proof of principle* (TRLs 4 – 6), and *proof of performance* (TRLs 7 – 8), as per table below. The first group includes basic research, technology formulation, and applied research, and generally introduces a “reality check” into the development process.

²⁸ Enspire Science: <https://enspire.science/trl-scale-horizon-2020-erc-explained/>

²⁹ Source: Contact Office for European Research Innovation and education
https://www.swisscore.org/Lists/Public/Upload/20140407_Decision_Model_H2020.pdf

¹⁹ <http://quiz.iscape.smartcitizen.me/>

²⁰ Published results can be found on iSCAPE website: <https://www.iscapeproject.eu/results/>

The second group contains small- and large-scale prototype and/or a prototype system, and usually supports real-world testing. The third group involves the application of an innovative system or the development of commercial systems. TRL 8-9 are referring to the last steps taken before the product reaches the market.

Phase	Description	TRL
Concept development	Basic research, technology formulation, applied research	1 - 3
Proof of principle	Small/large scale prototype development unit prototype system	4 - 6
Proof of performance	Innovation system, first of the kind commercial system	7 - 8

Table 5: Technology Readiness Levels (Source: Contact Office for European Research Innovation and Education)

The involvement of SMEs as part of the iSCAPE Consortium facilitates the faster deployment and commercialisation of the technologies developed and used throughout the life of the project. The insight and expertise brought by these organisations allowed for concrete exploitation strategies to be devised by using pre-existing networks and distribution channels.

Furthermore, some of the technological solutions deployed by iSCAPE have been previously developed by other projects or commercial partners, and as such, they are building on existing technology. This continuity allows for these products to be placed in groups 2 Proof of Principle and 3 Proof of Performance. A structured assessment is presented below:

Low-cost sensors

Two different sensing platforms were developed by iSCAPE partners: a high-end sensing platform (Living Lab station) and a low-end sensing platform for Citizen Science initiatives (Citizen Kit). The two products focus on integrating air pollution data already available in different cities, and on developing a sensor structure to raise awareness amongst individuals and communities through the collection of environmental data at urban level³⁰. The technology was previously validated by IAAC as part of the **Smart Citizen** initiative where several hundreds of environmental sensors have already been sold and are currently transmitting data. The citizen software and hardware infrastructure has been successfully running for several years and both insights and technical knowledge has been transferred to the **Citizen Sensor Kit 2.1** by undergoing a series of improvements and developments during the iSCAPE project. The two new platforms use multiple sensor boards, including:

- Urban sensor board, measuring temperature, humidity, noise, light, and PM2.5;

³⁰ iSCAPE, 2019: https://www.iscapeproject.eu/wp-content/uploads/2019/04/iSCAPE_D3.5_update.pdf

¹⁹ <http://quiz.iscape.smartcitizen.me/>

²⁰ Published results can be found on iSCAPE website: <https://www.iscapeproject.eu/results/>

- An auxiliary board capable of driving two Particulate Matter sensors required for specific deployments as an external temperature sensor or an anemometer; and
- An auxiliary board driving 3 Alphasense Ltd. Electrochemical Series B Gas Sensors designed for ultra-low noise, high-performance and low power operation.

These boards were developed as a means of reducing the cost of the old units (now, approx. 100 euro per Smart Citizen Kit) and to provide more accurate results in line with EU requirements. The **Smart Citizen Kit** (low-cost sensor) is already commercially available, whereas the online data platform - **Smart Citizen Platform** - is used in multiple projects. More than 700 units of the **Smart Citizen Kit 2.1** have already been sold for commercial projects through custom projects or directly to customers worldwide by [SEEED](https://www.seeedstudio.com/Smart-Citizen-Kit-p-2864.html)³¹ at the time of report writing. According to these results, TRL 8 has been assigned to these products. Throughout the life of iSCAPE, **80 Citizen Kit and 12 Living Lab Stations were tested** in the iSCAPE Living Labs. Prior to the end of the project, another **60 and 20 units, respectively, will be shipped** to project partners for further use. The **Living Lab Station** (high-end sensors) are considered to be **TRL5/6** as the prototype during the course of the project was tested in an intended environment, however, some additional efforts were required to achieve the expected performance level. This was due to a common concern of low-cost sensors not being sufficiently reliable in terms of data accuracy. For this reason, additional efforts were carried out to ensure the validity of the measured data in addition to the evaluation of the sensors in the field as part of the measurement campaigns. Limitations and potential improvements were identified and, when possible within the scope of the project, implemented. An important advantage of the project mindset was that the solutions were designed with a modular approach in mind, and future opportunities can be built upon the solutions presented hereby.

Passive Control Systems

As part of iSCAPE strategy against air pollution, Passive Control Systems (PCSs) in the shape of low boundary walls, green infrastructures, photocatalytic coating, and transport behaviour interventions (particularly relevant to the Hasselt Living Lab) were deployed in the different Living Labs part of iSCAPE (Dublin, Guilford, Lazzaretto, Vantaa, Hasselt, Bottrop, Bologna). The TRL assessment is particularly relevant in the case of photocatalytic technologies, which although being a well-known, have been mostly deployed as a coating on road surfaces and tunnels. Nanoair Solutions (PURETI), a member of the iSCAPE Consortium, is an SME that manufactures and distributes products for the improvement of air quality. Its product, Pureti (produced by Nanoair under a toll agreement with Pureti USA HQ), has already reached TRL 9, but it has not been previously tested on residential and commercial building facades. As a result, the iSCAPE's focus was to verify the successful implementation of Pureti in urban spaces and move from a TRL system prototype demonstration in the operational environment or the LLs to a **TRL 8** system complete and verified.

³¹ <https://www.seeedstudio.com/Smart-Citizen-Kit-p-2864.html>

4.2 Partner Perspectives

The following sub-chapters outline the different partner perspectives which emerged after the consolidation of the individual Business/Mission Model Canvases. This inclusive approach ensured that all the members of the Consortium had offered their outlook on value propositions, which not only endorsed the Exploitation Strategy but also facilitated the emergence of the five future opportunities. The following subsections summarise the input from all iSCAPE partners, including academic institutions, intermediary organisations, city councils and SMEs.³²

4.2.1 Academic Institution

The academic partners played an important role in distributing the results of iSCAPE in order to apply the lessons learnt in terms of interventions to improve air quality in urban environments to other cities in the EU and worldwide. They also concentrated effort into effectively translating scientific and technical findings into policy recommendations for further exploitation on political level. The BMC report from the academic members of the Consortium indicates a primary need to raise citizens' awareness and to deploy educational schemes for the general public (focusing on children and young adults), relying on evidence-based information on urban pollution to institute behavioural change through seminars and workshops. The key value propositions outlined by the academic partners of the Consortium identify the overall commitment for academic institutions and research centres to **generate expertise in solutions to climate change and air pollution control**. Keeping up to date with new technologies and assembling innovative algorithms and perspectives ensures that high-quality, relevant research is conducted using evidence-based information and simulation models.

The work carried out by the universities partnering in iSCAPE (UCD, UNIBO, UoS, TUDO, UH, TCD, IAAC) have played a vital role in the assessment and analysis of the effectiveness of the project results through the real-life testing, field campaigns and simulations. They provided a fundamental expertise in the fields of spatial risk and modeling, climate change research, living lab approach, mobility research and IT to ensure that the iSCAPE project is conducted in compliance to the highest standards. In addition to the scientific contribution to urban pollution, these members have arranged citizen and stakeholder engagement sessions through, for example, *play-and-learn* series workshops and direct meetings and collaborations with local stakeholders (e.g. city councils, public organisations, local companies, NGOs).

iSCAPE's scientific and technical reports are intended to directly benefit cities and authorities in charge of environmental, mobility and green infrastructure management within a given city. The Living Labs were largely led by academic institutions (the only exception being the Vantaa Lab, led by FMI), and each of Living Labs has been evaluated externally at the end of the project to investigate its viability past the lifespan of iSCAPE. The recommendations received suggested further development of transparent

³² Consolidated BMCs can be found in the Annex of this document.

governance and management models with clear roles and responsibilities, improved coverage of the value chain, creation of a unique identity for each individual Living Lab and the development of a feasible business model. Each Living Lab endorsed the feedback from external evaluators and developed a set of long-term goals and individual action plans with milestones for the following years³³.

The overall knowledge generated throughout the life of the iSCAPE project provides a solid foundation for future projects funded by national and international fundingschemes, such as Horizon2020/Horizon Europe, and may potentially be used as *best practice* materials adopted by cities, municipalities, international organisations and NGOs.

4.2.2 Intermediary Organisations

Intermediary Organisations in the iSCAPE Consortium (FMI, JRC, ARPAE, FCC, ENoLL) play a pivotal role in final results' exploitation by acting as a link between industry, public authorities, civil society organizations, and scientific communities. Organisations that fall under this category include a Research and Service Agency under the Ministry of Transport and Communication (FMI), a Regional Agency funded by the Regional Health Fund (ARPAE), a European Network of Living Labs (ENoLL), the Joint Research Centre (JRC) funded by the European Commission, and an Urban Innovation Centre (FCC). Their participation is vital in promoting the project's outcomes to policymakers and public authorities, and in facilitating their deployment. Key value propositions from this perspective include the tailoring of iSCAPE's final results for the purpose of training, awareness campaigns, tools for policy changes, as well as for the implementation of Living Labs approach to address urban air pollution.

These organisations have access to a wide range of environmental data (e.g. ARPAE manages more than 20 different monitoring networks, and datasets pertaining to air quality and meteorological parameters), in addition to a more flexible organisational structure. As a result, they are able to engage the right experts to design more tailored messages and bridge the knowledge gap between industry, public authority, and civil society at large. By providing support to policymakers and linking them with scientific communities and outputs their participation in iSCAPE had a significant impact on the project's Exploitation Strategy due to their catalyst position. Their engagement was instrumental for developing iSCAPE's Living Labs, as the latter were supported by vast professional network and experience in Living Lab management (e.g. ENoLL offers capacity development opportunities to new and upcoming Living Labs). Furthermore, intermediary organisations' quantitative assessment of the effects of PCS on urban air quality helped the definition of local air quality policies and regulations and their implementation towards smart cities, and as a European or Governmental resource for air quality and climate change mitigation.

These organisations have the direct power to impact city councils, local municipalities and to encourage change in EU/National policies (usually their services require issuing formal

³³iSCAPE, 2019: https://www.iscapeproject.eu/wp-content/uploads/2019/09/iSCAPE-D5.5_Final.pdf

advice upon request from relevant authorities), which may result in triggering innovation initiatives. They provide technical information to decision-makers on a wide variety of environmental issues, and a front-end for citizens and enterprises, and can be involved in networks of projects, both as partner and end-user. Their intermediary position and well-structured understanding of what cities are facing are vital in assisting the project's results to be adopted by city councils, environmental agencies and policymakers.

4.2.3 City Councils (DCC)

Vital for this project's success was to incorporate private companies and SMEs, as well as city councils and local municipalities, to ensure the feasibility of the results and to assist their commercial exploitation. Cities around the world are increasingly under pressure to deal with air quality issues and the associated health concerns. One of the impediments to their action is a lack of localised, accurate and evidence-based information (e.g. there is not sufficient data available on the performance and effectiveness of the solutions proposed to reduce exposure to air pollution, such as green and physical infrastructures). In addition, national air pollution monitoring networks are often limited in scope, and there is a shortfall of monitoring stations in regional or local scales. Cities need to develop, for instance, more sustainable transportation strategies and improve public transportation options to tackle major sources of air pollution and to reinvent urban environments by providing equal social and economic opportunities for all of their residents.

Dublin City Council plays the role of an end-user of the research results driving policy change, and it provides and facilitates access to its air pollution monitoring network and monitoring datasets. The involvement of DCC facilitated access to locations and reference equipment for the co-located calibration campaigns for the iSCAPE citizen science and living lab stations. It was also directly engaged in the project implementation and co-creation activities (e.g. Hack the Air), and it played an instrumental role in results dissemination and exploitation. DCC supported research activities conducted by the UCD team including 1) assessment and analysis of the effectiveness of a low boundary wall through real-life testing, field campaigns, and simulations; 2) assistance in writing recommendations and guidelines to facilitate the implementation of LBW, and 3) performance assessment of low-cost sensors.

Expansion of monitoring networks and enhancements of the modelling and forecasting capacity would improve the overall understanding of air pollution. It will provide cities with evidence-based information on the effectiveness of a number of solutions and recommendations for their implementation. The deployment of this information will then affect recommendations and interventions in the climate action plans for cities aiming the reduction of pedestrian exposure to air pollution. Through iSCAPE citizens have been given opportunities to actively participate in solving air pollution challenges via co-creation activities and citizen science initiatives. These activities were organised to raise the citizens' awareness of air pollution and to promote environmentally-friendly behaviour so that citizens could take a more active part in reducing the carbon footprint.

4.2.4 SMEs

SME participation was key to facilitating the dissemination of commercial findings to benefit the EC business community at large. An inclusive approach has been adopted to adequately accommodate the needs of the sector through ongoing collaborations with stakeholders, living labs, authorities, industries working in the sector of atmospheric pollution and climate change and international organisations. To maximise exploitation, partners were also directly interacting with industry to explore the requirements for exploitable deliverables.

PURETI

PURETI offers a photocatalytic coating technology for surface treatment that can be applied both indoors and outdoors as a means of improving air quality. The company is considered an end-user, as its participation in the project ultimately helped improve the application process of their product and widen the company's professional network and customer base. Although photocatalytic coating was not developed as part of iSCAPE and already existed as technology, it had never been implemented in commercial and residential settings. The product needed to be validated in different environments before receiving recognition by public authorities, city councils and local municipalities as a reliable and sustainable solution to address air pollution. The company's participation in iSCAPE exacerbated its acceptance and access to some Municipalities and Governmental institutions due to the pilot tests conducted throughout the lifespan of the project. For instance, final negotiations are held with the Port of Barcelona and the Government of Catalonia to do a pilot test which involves EU measuring of air quality stations, low-cost air quality sensors and Pureti's application on more than 5.000 m². In iSCAPE, the Pureti product was applied in Bologna, as part of a field campaign run by UNIBO. Future interventions are currently being planned by PURETI, such as a collaboration with Eiffage (one of Europe's largest public construction firms), offering a customised spraying vehicle that quickly applies the product on the roads, outdoor parking spaces and urban areas.

T6 Ecosystems

T6 is a small company with a long experience in integration of modern technology and complex ICT systems in environmental protection and sustainable development research issues, as well as in participating and coordinating international projects, many of them funded by the EC. T6 looks at innovation at the crossroads between technology, user acceptance and cultural diversity, and within iSCAPE, it has been involved in a range of activities including: 1) socio-economic and environmental impact assessment of iSCAPE research activities, 2) impact assessment of policy measures on environment, economy, society, 3) analysis of citizens' behaviour changes around air pollution, and 4) dissemination and communication of research and policy results.

T6 together with FMI developed the methodology for the socio-economic impact assessment, and supported the research on behavioural interventions for air pollution actions. It played an active role in the research and policy dissemination by engaging with

different stakeholders through the Virtual Living Lab, which provides a dedicated output to city planners, architects, people interested in Living Lab activities.

5 Five Opportunities for Exploitation

Five high-level opportunities for exploitation have been mapped out based on specific target groups analysis and on insights deriving from individual and consolidated BMCs discussed in earlier chapters. The opportunities listed below summarise potential paths of exploitation and outline in a pragmatic manner how they can be deployed by iSCAPE partners in the future. The target audiences in consideration are external to the project and do not reflect the exploitation by other members of the Consortium. The five opportunities are not mutually exclusive and indeed, several have been considered in aggregation.

iSCAPE TARGET AUDIENCES	iSCAPE EXPLOITATION OPPORTUNITIES
Policy audience (Local, National, and EU Policy-makers; Regional, National or European Environmental Agencies, City councils and Local municipalities)	5.1 European or Governmental Resource for Air Quality and Climate change Mitigation
Research audience (Air quality, air pollution, climate change, urban sustainability researchers, universities, research institutes, scientific community, research-driven networks, other EU-funded projects)	5.3 iSCAPE Output as a Basis for Further Scientific Research 5.4 iSCAPE as Educational Concept
Planning audience (Architects, Urban Planners, Companies and other organisations offering services for city planning, designing, administration)	5.2 iSCAPE Smart Citizen Approach as an implementation tool towards Smart Cities
Business audience (Research-market oriented institutions, SMEs, Private investors, Public business supporting agencies)	5.2 iSCAPE Smart Citizen Approach as an implementation tool towards Smart Cities
Civil society (Citizens and Citizen Communities, NGOs, Living Labs dealing with smart city initiatives, Innovation Labs dealing with urban sustainability, climate change and environmental protection)	5.2 iSCAPE Smart Citizen Approach as an implementation tool towards Smart Cities 5.5 iSCAPE as a Social Enterprise, improving the quality of life in Europe

Table 6: Target Audiences and Potential Opportunities for iSCAPE's KERs

5.1 A European or Governmental Resource for Air Quality and Climate Change Mitigation

This opportunity mainly involves those KERs that are in a position to support policymakers and to prompt change through policy action. The iSCAPE results that fall under this category include guidelines, policy briefs, recommendations, research data, knowledge and skills from Living Lab Stations and the Citizen Kit. The target audience consists of national and EU policymakers and regional, national and/or European Environmental agencies, city councils and local municipalities.

Exploitable Results: Guidelines, policy briefs, recommendations, research data, knowledge and skills from Living Labs Stations and the Citizen Kit	Policy audience: EU policymakers and regional, national and/or European Environmental agencies, City Councils and Local Municipalities
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Table 7: iSCAPE as a European or Governmental Resource for Air Quality and Climate Change Mitigation - KERs and Target Audiences

• Which partners should exploit this?

As mentioned earlier, intermediary organisations serve as a link between industry/academia and public authorities, as they are able to engage with the right experts in vast professional networks. As such, they often act as gatekeepers for policy action, and bridge the flow of evidence-based data on the effectiveness of solutions and recommendations for their implementation, which is often provided by academic institutions. Therefore, iSCAPE partners that fall under this category include almost all partners of the Consortium, as they have worked on explicit policy guidance deliverables, such as *T7.2 from WP7 - Generalised solutions for urban infrastructure and related decision-makers* (lead UoS, supported by UCD, FMI, UNIBO, TUDO) and *D7.11 Living Labs for Air quality knowledge and policy package* (ENoLL, FCC, UCD, UoS, UNIBO, TUDO, UH, FMI, IAAC, T6) among other relevant material produced throughout the life of the project.

• What are the exploitation opportunities?

Air quality and climate change mitigation are pressing matters for cities around the world and policymakers at different levels are looking for independent, evidence-based recommendations to be translated into public action. As such, iSCAPE's related foreground – technical reports, Living Lab Stations and Citizen Kit, policy briefs and recommendations, background knowledge have the potential to receive further funding from the organisations falling under the policy audience. In addition, as these results have the potential to impact city councils, local municipalities and to encourage change in EU/National policies, they are likely trigger new innovation initiatives in the field.

5.2 iSCAPE Smart Citizen Approach Towards Smart Cities

iSCAPE Smart Citizen Approach includes hardware (Living Lab Stations and Citizen Kit) and software tools (a platform maintaining documentation regarding the Smart Citizen Kit and Living Lab Stations, the sensor platform, sensor analysis framework, guides for different features of the Citizen Kit) and was developed by IAAC to support and strengthen environmental monitoring through citizen empowerment. The target audience consists of citizens and citizen communities, Living and Innovation Labs engaging with urban sustainability, climate change, environmental protection and smart city initiatives, but also urban planners and organisations offering services for city planning.

Exploitable Results: Smart Citizen hardware and software tools	Civil Audience: Citizens and Citizen communities, Living and Innovation Labs engaging with urban sustainability, climate change, environmental protection and smart city initiatives Planning audience: Architects, Urban Planners, organisations offering services for city planning Business Audience: Research-market oriented institutions, SMEs, Private investors, Public business supporting agencies
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Table 8: iSCAPE Smart Citizen Approach as an implementation tool towards Smart Cities - KERs and Target Audiences

- **Which partners should exploit this?**

Smart Citizen hardware and software tools were developed by IAAC, who has been in charge of its development and validation prior to the beginning of iSCAPE as part of the Smart Citizen Initiative. The Smart Citizen approach puts citizens in the centre of the agenda by providing them with objective and accountable information about the environmental conditions, including quality of air, levels of noise, quality of water and soil. By enhancing citizen participation this approach (including software and hardware tools) brings a new level of empowerment through technology and provides solutions that are cost effective and extend benefits for citizens and their contribution to Smart Cities. The main target customers are Smart Cities worldwide, including the ecosystem of public and private entities that play around them. In particular, the Smart Citizen approach is aiming at local authorities and decision makers, as well as environmental managers, infrastructure companies, and civil society organisations as they have an impact on the implementation of smart infrastructure and environmental monitoring.

- **What are the exploitation opportunities?**

The global smart cities market for information and communications technologies is expected to reach \$774.8 billion in 2021, with a compound annual growth rate (CAGR) of 17.7% from 2016 to 2021³⁴. The dominant trend for Smart Cities is expected to drive urban development for the next decade, and there is a considerable need for implementation tools to assist this transition. IAAC's participation in iSCAPE strengthened the development of both hardware and software components and widened their implementation in cities across Europe. The results are commercially available and were released using open source licenses (CERN and GPL). New cities are interested in employing these results, including Amsterdam, Belfast, Bottrop, Bristol, Copenhagen, Florencia (Columbia), Melbourne, Torino, Santiago de Chile, Sydney. The Smart Citizen initiative will continue to establish contact with different cities and to form partnerships with key players (e.g. Cisco and UN-Habitat³⁵), alongside further developing and maintaining existing products. It could be further developed into a monitoring app for Smart Cities, as a means of further engagement with citizens and citizen communities.

A Smart Citizen App could be used to ensure that accurate air quality information is accessible to the larger public. The development of the app may require the involvement of research-market oriented institutions, SMEs, private investors, and public business supporting agencies. Additional features may also be added to support behavioural change on an award-based principle, such as the *Bella Mossa App*³⁶, which rewards users for cycling, walking, or taking public transportation with various incentives (e.g. beer, ice-cream, or cinema tickets located in the city of Bologna). Incentivising the local community would also allow for close collaboration with local businesses, city councils and municipalities.

5.3 iSCAPE as a Basis for Further Scientific Research

iSCAPE has produced a number of algorithms as part of its research activities and during the sensor development, alongside methodologies, simulation methods, and observational and experimental data. Scientific and technical advancements were published in peer-reviewed journals and will be used by researchers, universities, research institutes, scientific community, research-driven networks and other Horizon 2020/ Horizon Europe Projects for further scientific discovery in the field of air quality, air pollution, climate change, and urban sustainability.

³⁴ Research and Markets, Smart Cities: Growing New IT Markets 2018:
https://www.researchandmarkets.com/research/zm6l8n/smart_citie

³⁵ UN-Habitat is the United Nations programme working towards a better urban future:
<https://unhabitat.org/un-habitat-at-a-glance/>

³⁶ Bella Mossa Website: <https://www.bellamossa.it/>

Exploitable Results: Algorithms, Research Methodologies, Simulation Methods, Observational and Experimental Data	Research Audience: Researchers, Universities, Research Institutes, Scientific Community, Research-driven networks, Horizon 2020/ Horizon Europe projects.
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Table 9: iSCAPE as basis for further scientific research - KERs and Target Audiences

- **Which partners should exploit this?**

iSCAPE's multidisciplinary approach brought together partners with different backgrounds to offer comprehensive solutions to air pollution and climate change. The project's results have made a substantial contribution to knowledge and have provided evidence-based data in the field. A thorough assessment of the six Living Labs³⁷ has been made to obtain a better understanding of the potential opportunities for each one, based on its specific context, strengths and weaknesses and suggested business models. 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. 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.

- **What are the exploitation opportunities?**

The project's results to date can serve as a foundation for another EU-funded project through the Horizon 2020/Horizon Europe programme, as well as other national funding schemes to further explore the possibilities of air quality improvement in urban spaces and climate change mitigation and the practices which have evolved during the life of the project. Horizon 2020 examples include the [Innovative nature-based solutions for carbon neutral cities and improved air quality LC-CLA-11-2020](#) and [Smart Cities and Communities LC-SC3-SCC-1-2018-2019-2020](#). Exploitation opportunities also include different industrial calls. Recently, Google issued a call for nominations for technologies measuring, planning, and reducing overall carbon emissions. Google launched the Environmental Insights Explorer (EIE), a new online tool in five European cities, namely Dublin, Manchester, Birmingham, Walverhampton and Coventry. The EIE was designed in collaboration with the Global Covenant of Mayors for Climate & Energy, and aims at achieving safe air quality and alignment between climate change and air pollution policies by 2030³⁸. Such initiatives are strictly related to iSCAPE's results and illustrate their relevance on a global scale.

³⁷iSCAPE, 2019: https://www.iscapeproject.eu/wp-content/uploads/2019/09/iSCAPE-D5.5_Final.pdf

³⁸ Full article available here: <https://breathelife2030.org/news/google-wants-help-cities-around-world-measure-air-pollution-calls-nominations/>

5.4 iSCAPE as an Educational Concept

In addition to scientific and technical contributions to knowledge, iSCAPE also developed educational concepts and materials to be used in schools, as part of a pro-environmental approach designed to assist behavioural change in younger generations. The target audience consists of children, university students, teachers and educators (including the Department of Education and Skills), but also Living and Innovation Labs aiming to use similar engagement methods as part of their communication and dissemination strategies.

Exploitable Results: Educational concepts and materials	Civil Society: Children, University Students, Teachers, Educators; Living and Innovation Labs
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Table 10: iSCAPE as an Educational Concept - KERs and Target Audiences

- **Which partners should exploit this?**

This exploitation opportunity is most relevant to academic institutions, as, by definition, they play a focal role in education, and have critical insight into the needs of educational systems. Therefore, by introducing educational concepts in school, they can adopt an alternative approach to ingraining the need for environmental change in children and young adults.

- **What are the exploitation opportunities?**

A large part of iSCAPE results is dedicated to the importance of behavioural change as key supporting mechanism needed to reduce carbon emissions and encourage sustainable mobility patterns. The mindset shift is easier to accomplish at an early age and allows young children to become catalysts of change by involving their families. A few educational concepts have been carried out by iSCAPE, for example the co-creation activities for the Wandering Trees Parade 2019 developed by Bottrop Living Lab. Educational materials have also been produced in the form of an informative booklet ([The Air We Breath booklet](#)) which have been distributed in several schools as a teaching resource, and during the European R&I days - Science is wonderful, held in Brussels (September 2019). Similar materials and approaches could be developed and distributed in the future to ensure that younger generations have received proper instruction on critical matters, environmental and otherwise.

5.5 iSCAPE as a Social Enterprise, Improving the Quality of Life in Europe

The six Living Labs offered an innovative approach towards the optimisation and deployment of passive control systems and introduced different incentives to behavioural change. They played an active role not only in monitoring the improvements delivered by cutting edge technologies but also in engaging local stakeholders, citizens and communities via co-creation and as a result, increased their awareness.

Their further development is critical to ensure that environmental concerns, such as air quality and climate change mitigation, are addressed and that adequate measures are being taken. The target audience consists of NGOs, Living and Innovation Labs in terms of the lesson learnt guidelines that were issued as part of iSCAPE, but ultimately aims at improving the quality of life for citizens at large.

Exploitable Results: Living Labs Methodology, Living Labs Knowledge and Skills	Civil Society: NGOs, Living and Innovation Labs, Citizens at large
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Table 11: iSCAPE as a Social Enterprise - KERs and Target Audiences

- **Which partners should exploit this?**

The partners who should exploit these results are naturally the ones who have already taken part in iSCAPE Living Labs interventions, such as UCD, UNIBO, UoS, FMI, TUDO, UH, FCC, ENoLL. They can further develop the overall findings and incorporate innovative elements in the already existing labs, as well as establishing new ones in different locations. Ultimately, all members of the iSCAPE Consortium could exploit these the expertise from the Living Labs and use it in their respective professional networks.

- **What are the exploitation opportunities?**

The opportunities that these sets of exploitable results offer could fasten different Living Labs activities that are currently being placed not only in Europe but also around the globe. Being part of the Living Lab Community (which has been facilitated through ENoLL's participation in iSCAPE), ensured that relevant materials had been included in The Living Lab Guidebook: For Cities Fighting Against Air Pollution were made available to relevant target groups (Living and Innovation Labs).

Separate interventions from the Living Lab experience, such as the adoption of sustainable mobility patterns (most prominent in the Hasselt Living Lab), could also be incorporated by large multinational corporations as part of their Corporate Social Responsibility (CSR). This option would be expected to reach broader market segments and end-users such as Google, PwC, Accenture, and Deloitte through reached advertising. For instance, face-to-face workshops whereby iSCAPE partners demonstrate the effects that air pollution have on human health, and potential behavioural changes that may lead to more sustainable mobility patterns as part of the company's internal policies (e.g. commuting to clients' offices).

6 IPR and Commercialisation

The feedback received from all members of the Consortium through the Business/Mission Model Canvas has been vital in assessing how effectively the project activities have been carried out and how these results have changed/evolved throughout the project.

The three categories of consortium members (Academic Institutions, Intermediary Organisations, and SMEs) have collaborated jointly throughout the project to share contacts and expertise in the pursuit of exploitation opportunities within their domain. iSCAPE advocates for the effectiveness of openness and sharing, and is committed to make data collected during the project freely available without breaching the limit of personal privacy. To maximise the exploitation of all foreground results, iSCAPE partners have agreed to the following IPR:

Release part of the results of the project as open source (i.e., *the Smart Citizen platform as open source software*) as a means of dissemination to a wider audience and therefore available for a third-party exploitation;

Have iSCAPE partners directly benefit from the results and use them to further develop their own commercial offering thanks to the advancements reached during the project;

Facilitate further use of results through active stakeholder engagement, innovation management and Data Management Plan.

Measuring the project's success will ultimately be achieved through the deployment of exploitation strategies which may have commercial, educational, and societal impact on stakeholder groups. Two aspects of the overall exploitation strategy could be outlined as a means of maximising exploitation:

- **Industry differentiation** – how each of the groups could maximise potential based on their own industry and areas of expertise;
- **National adaptation** – how could the iSCAPE technologies and platforms be utilised in different countries in Europe to maximise results and to address air pollution and climate change.

As the partners will ultimately be taking responsibility for implementation of their own strategies, there is still scope for further development and possibilities to open before the final review is conducted by the Commission.

7 Conclusion

The inclusive approach that has been adopted for this Exploitation Strategy allowed for a detailed overview of all potential fields of exploitation of iSCAPE results and provided specific examples of how results have been disseminated and exploited to date. All project's exploitable results have been mapped through the collective effort of members of the Consortium, including individual exploitation potential and IPR considerations. The methodology also cross-references outcomes with iSCAPE's Communication and Dissemination Strategy and Data Management Plan to ensure that there is a consistency amongst different deliverables, and that relevant aspects have been considered.

By linking key exploitable results to specific target audiences, this report outlines five opportunities focusing on the commercial, political, societal, educational, and scientific aspects and offers concrete paths of exploitation beyond the end of the project. Each opportunity determines which partners should exploit the project's results falling into the category, what are the exploitation possibilities, and which is their target audience. These insights help to identify specific fields of exploitation and illustrate in a pragmatic manner how results can be further enhanced to serve the general public.

This Exploitation Strategy demonstrates how iSCAPE succeeded in developing cutting edge innovative solutions and expertise to improve air pollution management and control and to mitigate climate change. Finally, it outlines in a straightforward way how project's outcomes could endorse acute environmental issues and what can be done to ensure their future sustainability, which would be highly beneficial to citizens around the world.

8 Annex

8.1 Business Model Canvas

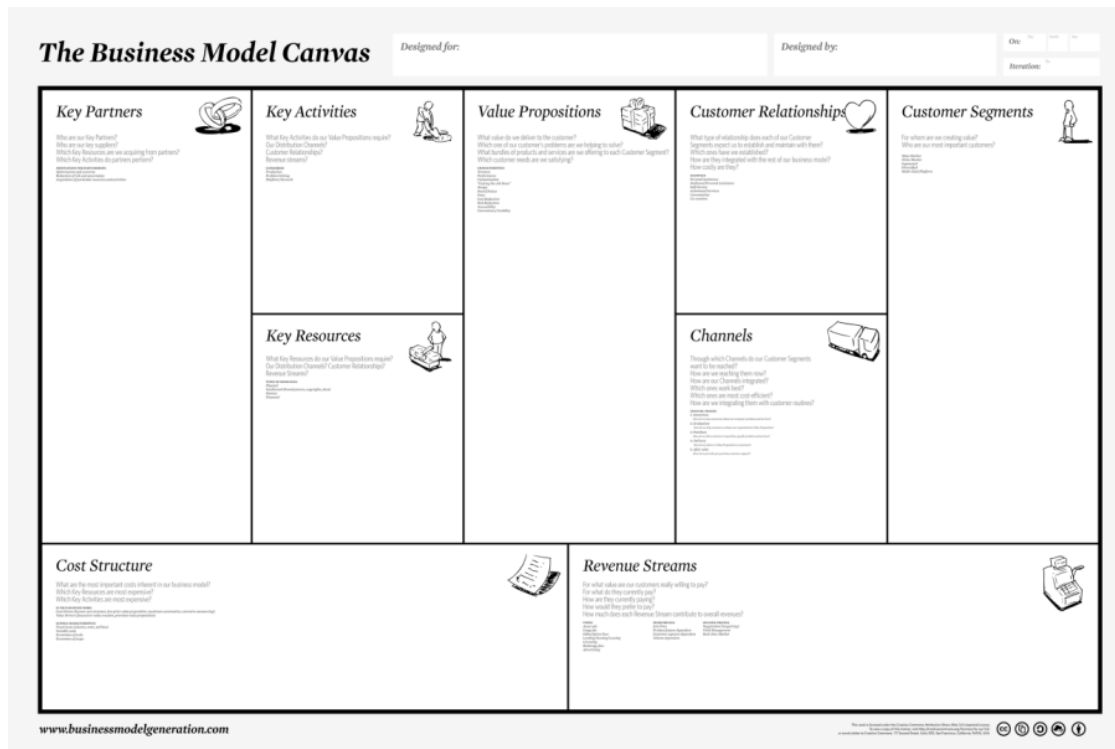


Figure 2: Business Model Canvas Template via <https://canvanizer.com>

Infrastructure

Key Activities: The most important activities in executing a company's value proposition.

Key Resources: The resources that are necessary to create value for the customer. They are considered an asset to a company, which are needed to sustain and support the business. These resources could be human, financial, physical and intellectual.

Key Partners: In order to optimise operations and reduce risks of a business model, organisations usually cultivate buyer-supplier relationships, so they can focus on their core activity. Complementary business alliances also can be considered through joint ventures, strategic alliances between competitors or non-competitors.

Offering

Value Propositions: The collection of products and services a business offers to meet the needs of its customers. According to Osterwalder, (2004), a company's value proposition is what distinguishes itself from its competitors.

Customers

Customer Relationships: To ensure the survival and success of any businesses, it is essential to identify the type of relationship they want to create with their customer segments.

Customer Segments: This section seeks to identify which customers it tries to serve. Various sets of customers can be segmented based on the different needs and attributes to ensure appropriate implementation of corporate strategy meets the characteristics of a selected group of clients.

Channels: A company can deliver its value proposition to its targeted customers through different channels. Effective channels will distribute a company's value proposition in ways that are fast, efficient and cost-effective. Channel phases are shown as:

1. **Awareness** – How do we raise awareness about our company's products and services?
2. **Evaluation** – How do we help customers evaluate our Value Proposition?
3. **Purchase** – How do we allow customers to purchase our products and services?
4. **Delivery** – How do we deliver a Value Proposition to customers?
5. **After-sales** – How do we provide post-purchase customer support?

Finances

Cost Structure: This describes the most important monetary consequences while operating under different business models.

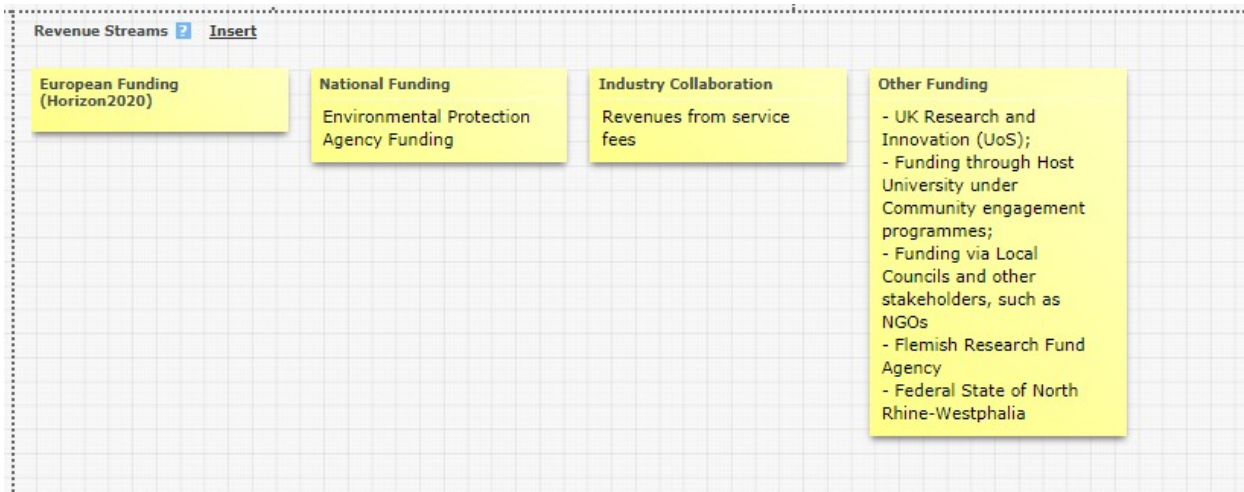
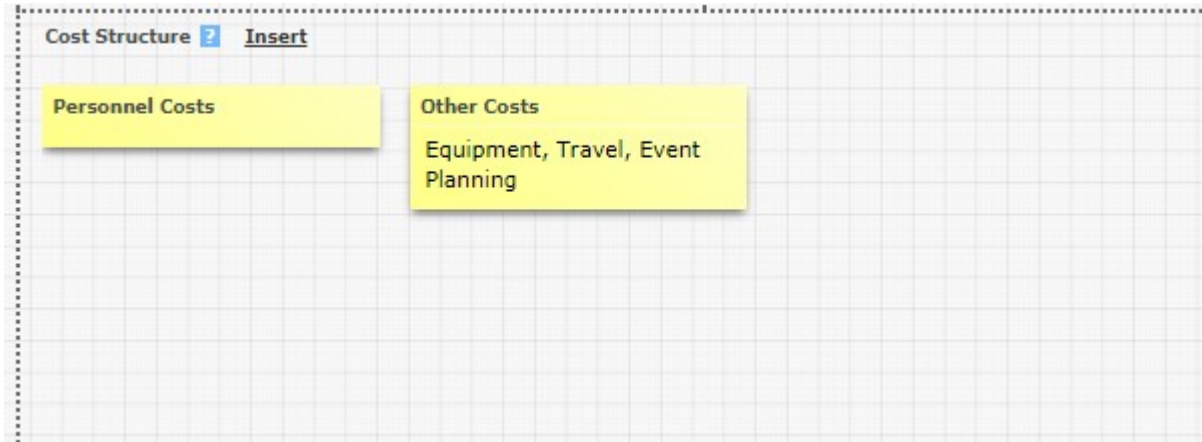
Revenue Streams: The way a company makes income from each customer segment.

8.1.1 Consolidated BMC/MMC




8.1.1.1 Academic Perspective

Key Partners Insert	Key Activities Insert	Value Proposition Insert
<p>iSCAPE Partners</p> <p>Academic Network</p> <p>Collaborations with third parties</p>	<p>Project Coordination and Management (UCD)</p> <p>Research Activities</p> <ul style="list-style-type: none"> - Literature and state-of-art review on Passive Control Systems; - Assessment and Analysis of project's results effectiveness through the real-life testing, field campaigns and simulations; <p>Citizen & Stakeholder Engagement</p> <ul style="list-style-type: none"> - Play and Learn workshop series (n.2 workshops conducted following the iSCAPE's CS guide - developed by FCC); - Co-creation sessions (e.g. Hack the Air); - Meetings and engagement sessions with local stakeholders (city, public organizations, local companies, NGOs); - Empowering children, public and professionals with cutting-edge research to influence their behaviour; <p>Didactic Activities</p> <p>Teaching courses at different levels which allows to maintain good communication with young generations concerning the air quality and individual behaviour</p>	<p>Evidence-Based Information on Urban Air Pollution</p> <p>Cities can adjust measures targeting the reduction of pedestrian exposure to air pollution; Through iSCAPE, cities are provided with low-cost air pollution sensors so that they may have a larger network of sensor nodes enabling them to collect localized air pollution data;</p> <p>Behavioural Interventions (UH)</p> <ul style="list-style-type: none"> - Mobility-related individual data integrated with air quality data instrument to coach individuals to adopt appropriate mobility choice (e.g. walking, biking, using public transportation) as part of Hasselt Living Lab Activities <p>Mobility Simulation Platform</p> <p>Activity-based simulation model that predicts activity-travel pattern of the entire population for a given city. The simulation platform is used to test few policies (such as car-access restriction in central area of city, increase in bus frequency for certain routes in the city) in Hasselt, Bologna and Vantaa.</p> <p>Air Quality Quiz / Interactive Display System can be used for kids to experiment and learn</p> <p>Better Knowledge in solutions to climate change and air pollution</p> <p>Innovative algorithms and perspectives</p> <p>Keeping up to date with new technologies, being beneficial to research and to proposals for national and international funding</p>
	<p>Key Resources Insert</p> <p>Human Resources specialising in:</p> <ul style="list-style-type: none"> - Spatial Risk and Climate Change Research & Spatial Modeling - Living Lab expertise - Mobility Research Expertise - IT Expertise - Project Management - Qualitative and Quantitative Research 	

Customer Relationships ? Insert	Customer Segments ? Insert
Direct Communication and Engagement	Stakeholders
Online Dissemination and Communication	<p>Key stakeholders like the Regional Environmental Protection Agency, the Municipality, the Region are strongly interested in the research outcomes to update the existing plans for air quality and climate change.</p> <p>Other interested stakeholders are also represented by local citizen networks focusing on air quality and climate change issues, such as the Aria Pesa network</p>
Co-creation Events	Cities & Public Authorities
<p>Used to obtain a better understanding of all the aspects linked to a given research area; Co-creation events were used to support the development of innovative air quality low-cost sensors;</p>	Scientific Community
Continuous update on current research needs	<p>Schools, environmental educational portals, environmental departments/agencies</p>
<p>The continuous update on the research topics with the scientific community, together with the update of the needs of the local stakeholders helps to maintain the highest levels of research and to make it applicable to the needs of the local community and policies</p>	General Public
Focus on Cities	<ul style="list-style-type: none"> - Citizens; - During the course of the project, team's efforts were especially focused on engaging young people and children through co-creation;
<p>The research and products carried on iSCAPE directly benefit cities and authorities that are responsible for managing mobility within the city</p>	Citizen Communities and NGOs
	Project Sponsors & Funding Bodies
Channels ? Insert	
Prospective Project Partners	
European Commission	
DCC & Public Authorities	
Scientific Community	
Citizen Science Activities	
<p>Workshops, presentations, involvement with schools</p>	
Communication Tools	
<ul style="list-style-type: none"> - Website, social media, press releases, newsletters 	



8.1.1.2 BMC/MMC Intermediary Organisations

Key Partners  Insert	Key Activities  Insert	Value Proposition  Insert
<p>iSCAPE Project Partners</p>	<p>Training: D2.4 'Stakeholder management plan and local citizen engagement strategy for the living labs'</p> <p>It includes a set of tools to manage all stakeholders involved in the living lab, and for engaging citizens in the topics of air pollution and climate change (chapters 5 and 6). In addition, the material prepared for the training in London can also be used as a reference.</p>	<p>Publicly Available Documents</p> <p>By a review and rework of them, each one can be tailored to local needs and be reused for purpose of training, awareness campaigns, tools for policy changers.</p>
<p>Regional Government</p>	<p>Adaptation of cities to weather and climate change</p> <p>Providing cities with weather and climate risk assessment and adaptation guidelines following the Covenant of Mayors procedure.</p>	<p>Climate proof cities</p> <p>A well-structured understanding of what the city is facing now and what are the climate-change expected implications. Work is always done closely with the end-user.</p>
<p>Italian and European environmental agencies (cooperating in monitoring at national scale and specific projects)</p>	<p>Guidelines/Guides: The Citizen Science Park</p> <p>It provides a set of guidelines for LLs and in general scientific communities to set up and implement workshops for citizen science.</p>	<p>The quantitative assessment of the effects of PCS on urban air quality will help the definition of local air quality policies and regulations</p>
<p>ENoLL Network</p> <p>Network of Living Labs connected to ENoLL. Currently there are circa 150 Living Lab members connected to the ENoLL network, including public, private and academic organisations.</p>	<p>Definition of local-scale policies and regulations</p> <p>It provides technical advice to decision makers on a wide variety of environmental issues, and a front-end for citizens and enterprises. It is involved in international projects, both as partner and end-user.</p>	<p>Results of air quality measurement campaigns in urban canyons will help find the most effective policies for urban mobility (e.g. how to distribute resources between public transport and electrical mobility)</p>
<p>Professional Networks</p> <p>ENoLL is a partner in many European projects, engaged in the dissemination through the Living Lab way, co-creation, and real-life experimentation & pilot actions following LL methodologies, tools & methods. ENoLL's key partners also consist of many European organisations often engaged with European projects.</p>	<p>Living Labs certification and memberships</p> <p>ENoLL offers an evaluation procedure through which new Living Labs enter the network, if successful. Annually about 50% of the applicants pass the evaluation criteria to become ENoLL Living Lab members. Partners who are not Living Labs can become partners in the network through the innovation partner status, which does not require recognition of their status as a Living Lab.</p>	<p>The expertise obtained in the use of low-cost air quality sensors and citizen involvement will provide indications for future guidelines</p>
<p>Universities and Research Institutes (cooperation in EU projects, developing expertise and provide end-user feedback)</p>	<p>Living Lab Building Program</p> <p>ENoLL offers capacity development opportunities to new and upcoming Living Labs.</p>	<p>Empowering stakeholders to innovate</p> <p>By bringing multitude of stakeholders in co-creation, the aim of the LL is to empower all quadruple helix actors to contribute as actors, rather than factors, in the innovation process.</p>
		<p>Living Lab certification and membership</p> <p>ENoLL offers qualification process that allows Living Labs to carry the LL label, provided they have passed through the evaluation process successfully.</p>
		<p>Citizens at the centre of real-life setting</p> <p>Real-life setting is a central theme in Living Labs , ensuring that innovation occurs in a real-life scenario rather than behind closed doors.</p>




Customer Relationships ? Insert	Customer Segments ? Insert
Living Labs & Bringing the Community Together Members can also be considered customers, as they pay an annual fee for their membership. In return for their annual fee the ENoLL office organises annual conference bringing the community together, arranges dissemination actions (newsletter, social media, best project competitions, etc.). ENoLL also brings the members as partners in projects or as contributors with their specific expertise where needed.	EU/ Policymakers
Policymakers' Engagement Advice and services upon request from policymakers in connection with EU regulation	Local Municipalities/Transport Authorities
Intersection between Private/Public and Local Government/Transport Authorities <ul style="list-style-type: none"> - As part of the Catapult Network we work with industry, together with regional, national and international partners, to commercialise innovation in a way that drives long-term benefit to the UK economy - Negotiations held with the Port of Barcelona and Government of Catalonia to do a pilot test which involves EU measuring air quality stations, low cost air quality sensors and Pureti application on more than 5.000sqm in a initial test (Enroll) 	Citizens
Citizen Awareness Answers and regulation on specific environmental issues; awareness rising, education, communication on possible behavioural changes	Living Labs Members & Partners
Co-Design of workload for the successful implementation of smart city solutions Collaborative initiatives towards smart cities with a focus on air pollution	
New Up&Coming Living Labs	

Key Resources ? Insert	Channels ? Insert
<p>Access to high-quality data</p> <p>Access to a wide range of environmental data: ARPAE manages more than 20 different monitoring network, but the largest datasets pertain air quality and meteorological parameters (forecast, real-time and climatological)</p> <p>Expertise in providing support to policy makers, and in making connections between policy makers and the scientific community</p>	<p>Ordinary Marketing Channels</p>
<p>Living Lab Expertise</p>	<p>Internal Networks</p> <p>The Catapult is a reference at a national level (UK), connecting many private and public stakeholders. It also has many project at EU and global scale.</p>
<p>Technical Expertise</p> <ul style="list-style-type: none"> - Project Manager, Service Designer, UX, Graphic Designer (FCC); - Weather and Climate expertise (e.g. Copernicus Climate Change Service (C3S) - FMI); 	<p>Digital Marketing Channels</p> <p>Websites, Social Media</p>
	<p>Publicly Available Information</p> <p>Reports, Policy Briefs, lectures</p>
	<p>Policymakers</p> <p>Other Italian and European environmental agencies: working groups, common projects</p>

Cost Structure ? Insert
<p>Personnel</p>
<p>Materials and Other Costs</p>

Revenue Streams ? Insert			
<p>Local Authorities and Research Institutes</p> <p>The CS pack can be purchased by local authorities to bring forward a raise awareness campaign or CS activities. It can also be used as a valid tool for research bodies, where they decide to test new research strategies.</p>	<p>LLs and Academia</p> <p>The D2.4 and material produced during the iSCAPE events (OLLDs, SS, final event) are easily transferable and can be changed into engagement tools by the LLs or didactic material by Academia.</p>	<p>City Councils</p> <p>Purchase training/services</p> <p>Some activities offer a paid entrance option for externals to attend activities/training with a paid one-time fee</p>	<p>European Funding</p>

8.1.1.3 BMC SMEs

Key Partners  Insert	Key Activities  Insert	Value Proposition  Insert
<p>Enterprises in the field of passive control systems for air quality improvement</p> <p>Public Administrations interested in showing the impact of air quality improvement measures Edit x</p> <p>Port of Barcelona for an important trial collaboration with the Government of Catalonia</p> <p>Private Companies</p> <p>(e.g. Largest German smart fabrics manufacturer for public transportation to produce self-cleaning and odorless seats; Largest Spanish ceramic for façades producer for self-cleaning and decontaminating tiles)</p> <p>Public and Private research Institutions</p> <p>Collaboration is needed to implement research in different fields, e.g. climate change mitigation and adaptation, transformation to low-carbon societies, (Digital) Social Innovation, Media Convergence, citizen science.</p> <p>T6 looks at innovation at the crossroads between technology, user acceptance and cultural diversity.</p> <p>iSCAPE partners (collaborating for the Virtual Living Lab)</p> <ul style="list-style-type: none"> - University College Dublin (keeping the VLL site online after the end of the project) - IAAC (in charge of the design of the VLL) - FCC (provided a lot of contents on the VLL) <p>With IAAC and FCC it needs to be clarified if they are interested to continue to contribute to it.</p> <p>Other key partners for the single LL sites are the LL partners. Some of them are interested in keeping their site (e.g. Dublin), others not.</p>	<p>Virtual Living Lab (VLLs)</p> <p>A legacy version of the VLL will be created at the end of the project, leading to specific outputs for the target group of city planners, architects, etc.. After this final version the website will not be updated anymore by T6. It has to be checked with UCD if they plan to use it in the future.</p> <p>T6 has been involved in a range of activities including:</p> <ul style="list-style-type: none"> - socio-economic and environmental impact assessment of iSCAPE research activities; - impact assessment of policy measures on environment, economy, society; - analysis of citizens' behaviour changes around air pollution; - dissemination and communication of research and policy results <p>Collaboration with Government and Municipal Institutions</p> <ul style="list-style-type: none"> - Establishing connections with public authorities to inform them of feasible and economic solutions for pollution (e.g. Pureti has been used in 5 different towns) - The results of iSCAPE Project in UNIBO should be expansively disseminated in order to increase our possibilities with public institutions <p>Create Networks</p> <p>Presentations of new photo-catalytic technology in universities, schools and chambers of commerce events.</p> <p>Participate in International Trade Exhibitions</p> <p>We continuously think about which products in the market can have a symbiosis with our solution</p>	<p>Air-Quality Monitoring App</p> <p>Thanks to iSCAPE, T6 can participate in the development of a user-friendly web and smartphone app for the real time monitoring of air quality and temperatures into urban areas. Due to the relevance of the topic at the global level, this would represent a promising tool for citizens, as well as a market niche in expansion</p> <p>Buy software Develop webapp Windows phone market Android market</p> <p>Virtual Living Lab</p> <p>To provide dedicated output to city planners, architects, people interested in Living Lab activities.</p> <p>Value for Private Firms</p> <p>Increased sustainability through long-term solutions (Pureti can be applied outdoors to fight pollution)</p> <p>Value for Stakeholders</p> <p>CSR & Sustainability</p> <p>Better indoor air quality in public transportation, cleaner air cities, better disinfected hospitals and equipment makes a broad opportunity to add value to society while being more profitable</p>

Customer Relationships ? Insert	Customer Segments ? Insert
Private Firms <p>Nanoair offers exclusivity agreements to private companies to work in each market , industry or geography (from local to European or Worldwide). Nanoair accounts of 80% of the international sales of Pureti.</p>	Multi-level Governments and Public Institutions <p>Focus on increasing dialogue with citizens around air quality and assessing impacts of such dialogues (e.g. City Councils, Regional Governments)</p>
Public Involvement <p>Steadily more municipalities are requiring in their public tenders for road and Street maintenance the use of photocatalytic coatings. Nanoair is in are in final negotiations with the Port of Barcelona and Government of Catalonia to do a pilot test which involves EU measuring air quality stations, low cost air quality sensors and Pureti application on more than 5.000sqm in a initial test. Upon preliminary results the whole Port of Barcelona would be coated with Pureti in its 6 million of sqm.</p>	Private Companies <p>Focus on proposing sustainable strategies and technologies to reduce air pollution, or decreasing the contribution of their productive processes to air pollution.</p> <ul style="list-style-type: none"> - Encouraging industries to shift towards sustainable production; - Assist industries to produce producing products for reducing or monitoring air pollution (e.g., photocatalyc paintings, monitoring sensors) - B2B or B2GOV/Municipality - Exclusivity agreements to work with us in each market , industry or geography (from local to European or Worldwide). Enroll accounts for 80% of the international sales of Pureti.

Key Resources ? Insert	Channels ? Insert
Solution <p>Production of Pureti in an outsourced pharmaceutical laboratory facility in Valencia under a toll agreement of production of Pureti USA HQ.</p>	Salesforce <p>H2020 Network Collaborative channels created by the participation in previous projects and within iSCAPE.</p>
Expertise <p>iSCAPE competitive position: While there are several companies offering impact assessment in different fields, there are only a few organisations carrying out this type of analysis for R&D processes and EU projects. In this sense, T6 Ecosystems has a competitive advantage. IPR that must be respected: T6 Ecosystems operates following an open access approach to its intellectual products, including the impact assessment methodologies developed so far and applies to them the creative commons share-alike, no commercial, attribution licence.</p>	
Research <ul style="list-style-type: none"> - Developing new nanotechnologies products - Undertaken a one year study with the Government of Andalusia and the University of Granada a research study of Pureti in greenhouses - 30 university certifications to validate new technology on different substrates with the Franhoufer IST, University of Ferrara, Autonomous University of Barcelonaand University of Belfast 	

Cost Structure ? Insert

Personnel and Other Costs
Edit [x]
Personnel and raw materials are the most important costs followed by office and warehousing. Nanoair spends circa 10% of its turnover in R+D+I and certifications.

Travelling is an important variable cost since every week we take and average of 4 international flights.

Revenue Streams ? Insert

Public Funding
Future EU Project

B2B
Exclusivity contracts for a range of Pureti products with a focus on OEM markets.

8.2 Project Results Mapping Tool Created by the Consortium

Please refer to the empty project result mapping tool, created by the members of the Consortium to identify key exploitable results, their exploitation potential and relevant IP concerns:

Work Package	Project result	Brief result description	Result ownership/ Partners involved in producing the result	Exploitation potential	Exploitation objective	Exploitation type	Who filled in?

Figure 3: Project Results Mapping Tool

9 References

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