

URBREATH [101139711]

Systemic Integration of Transformative Technical and Nature-based Solutions to Improve Climate Neutrality of European Cities and Regions and tackle Climate Change: the URBreath Approach



URBREATH

D8.4 Exploitation and Business Plan & Commercialization Action Report – V1

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Disclaimer

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Executive Summary

The URBREATH project addresses the urgent need for sustainable urban transformation in response to climate change, employing a multidisciplinary approach that integrates Nature-Based Solutions (NBS), local community's engagement, and advanced digital technologies, and such as data-driven analytics. This deliverable, D8.4 Exploitation and Business Plan & Commercialization Action Report – V1, outlines a comprehensive strategy for maximizing the impact and adoption of URBREATH's Key Exploitable Results (KERs), positioning them for success across diverse urban sectors.

Through targeted innovations, URBREATH has developed a range of KERs designed to support cities in building climate resilience, enhancing sustainability, and creating livable urban spaces. These KERs include advanced tools such as ICT platforms for stakeholder engagement, digital twins for participatory urban planning, and predictive AI models for climate impact assessment. By providing these KERs, URBREATH equips urban stakeholders—including municipalities, planners, public health agencies, and private enterprises—with actionable insights and tools to address complex environmental and social challenges in real-time.

The project's exploitation strategy is founded on identifying the specific needs of target markets and tailoring KERs for maximum societal impact and market adoption. A central focus of this strategy involves engaging stakeholders from multiple sectors, including public authorities, environmental organizations, infrastructure developers, and research institutions. By fostering collaboration and knowledge exchange, URBREATH ensures its solutions are well-positioned to align with stakeholders' goals and existing frameworks, facilitating smoother adoption and integration within urban systems.

Furthermore, URBREATH's commercialization approach leverages Intellectual Property Rights (IPR) management, targeted dissemination, and adaptive market positioning. IPR management protocols safeguard the project's innovations while enabling strategic dissemination to maximize accessibility and impact. Preliminary market and competition analyses conducted for each ER highlight potential competitive advantages and positioning strategies, ensuring URBREATH's solutions stand out in a growing landscape of climate resilience technologies.

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List of Terms and Abbreviations

Abbreviation	Definition
AI	Artificial Intelligence
API	Application Programming Interface
ATC	Athens Technology Center
BAS	Basurama Asociación
CA	Climate Alliance
CDES	Communication, Dissemination and Exploitation
CM	Climate Modeling
DBC	Diadikasia Business Consulting
DSS	Data Spaces and Standardization
DT	Digital Twin
ENG	Engineering—Ingegneria Informatica SPA
ER	Exploitable Result
FIC	Fundacion para la Investigacion del Clima
FLC	Follower Cities
FRC	Frontrunner Cities
GOV&SI	Governance and Social Innovation
IAE	Innovation for the Engaged Librarian
ICCS	Institute of Communication and Computer Systems
IoT	Internet of Things
IPR	Intellectual Property Rights
KAMK	Kajaanin Ammattikorkeakoulu Oy
KER	Key Exploitable Result
LL	Living Lab
M&S	Modeling and Simulation
NBS	Nature-Based Solutions
NZC	NetZeroCities
OASC	Open & Agile Smart Cities
PESTLE	Political, Economic, Social, Technological, Legal, Environmental
PPM	Planning and Policy Making
ROI	Return on Investment
STP	Systemic Transformation and Participation
SITMP	Sprava Informacnich Technologii Mesta Plzne
SI	System Integration
TRL	Technology Readiness Level
UPM	Universidad Politécnica de Madrid
URB	Urbasofia SRL

VC	VirtualCitySystems GmbH
VCS	Virtual City Systems

1 Introduction

The URBREATH project represents a comprehensive effort to advance climate resilience and sustainable urban development through innovative tools and frameworks. By integrating Nature-Based Solutions (NBS), cutting-edge digital technologies, and local communities engagement, URBREATH empowers cities to respond proactively to the challenges posed by climate change. This deliverable outlines the exploitation and commercialization strategy for URBREATH's Exploitable Results (ERs), providing a structured roadmap to maximize market adoption, stakeholder engagement, and long-term impact across various urban sectors.

1.1 Purpose and Scope

This deliverable establishes a comprehensive commercialization strategy for URBREATH's ERs, focusing on targeted pathways for market adoption, stakeholder engagement, and societal impact. The deliverable offers project partners a clear guide for leveraging the ERs' potential across key market segments, identifying primary stakeholders, and positioning the project's innovations for sustained use within urban environments. The scope encompasses all ERs identified in the URBREATH project, detailing each ER's market potential, specific stakeholder relevance, and integration strategy within urban planning, public health, environmental management, and digital technologies.

1.2 Approach for Work Package and Relation to Other Work Packages and Deliverables

This deliverable is central to the exploitation and commercialization work package within URBREATH, which bridges the project's technical developments, stakeholder engagement initiatives, and market outreach efforts. The exploitation strategy outlined here synthesizes findings and outputs from several interconnected work packages to create an integrated commercialization plan. Key connections include:

- **Technical Work Packages:** The technical work packages focus on developing core tools and technologies, such as digital twins, AI models, and environmental simulation models, which form the backbone of the ERs. These packages' technical deliverables and technology readiness levels directly inform the exploitation strategy, defining each ER's commercialization potential and required advancements.
- **Stakeholder Engagement Work Packages:** Engaging key stakeholders—including urban planners, government agencies, community groups, and private sector entities—is essential for ER adoption. These work packages contribute insights into stakeholder needs and preferences, ensuring that the project's exploitation strategy is aligned with the priorities of those who will benefit most from the solutions.
- **Data Analysis and Modeling Work Packages:** These packages contribute high-resolution environmental data and predictive models critical to the value and functionality of ERs, such as

climate impact assessments and predictive urban simulations. The data infrastructure provided by these packages supports scientifically robust and marketable decision-making tools. This deliverable integrates URBREATH's technical outputs, stakeholder insights, and data-driven frameworks through collaboration across these work packages to create a cohesive exploitation plan.

Methodology and Structure of the Deliverable

The methodology employed in this deliverable follows a systematic approach designed to assess, position, and promote each ER for optimal impact in relevant markets. Key methodological steps include:

1. **Market Analysis and Stakeholder Identification:** A comprehensive analysis identifies target markets and stakeholders for each ER. Key stakeholder groups, including municipalities, policymakers, urban planners, private sector actors, and community organizations, are profiled to understand their needs, influence, and potential impact on adoption.
2. **Exploitation Strategy Development:** Customized exploitation plans for each ER include commercialization pathways, business models, and engagement tactics. These strategies detail specific approaches for embedding the ERs into stakeholders' operational frameworks, from local government and community settings to broader policy and regulatory domains.
3. **SWOT Analysis and Risk Assessment:** A SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis for each ER helps determine competitive advantages, potential challenges, and strategic opportunities. This analysis also includes risk management strategies to address regulatory, financial, and technical risks.
4. **IP Management and Dissemination Planning:** Intellectual property management and strategic dissemination are emphasized to protect the ERs while maximizing outreach and impact. These plans balance open access and proprietary considerations based on market relevance.

Structure of the Deliverable

The deliverable is organized into the following sections to provide a comprehensive overview of the exploitation and commercialization strategy for URBREATH's Exploitable Results (ERs):

- **Section 1: Introduction**—This section introduces the deliverable's purpose, scope, approach, and methodology. It highlights the deliverable's alignment with other work packages and deliverables, ensuring consistency in the project's overall exploitation strategy.
- **Section 2: Key Exploitable Results Description**—This section offers a detailed description of each ER, including technical specifications, intended applications, and alignment with URBREATH's objectives. It also outlines each ER's potential for commercialization and impact on urban resilience, helping stakeholders to understand the ERs' relevance to sustainable urban development.
- **Section 3: IPR Management**—This is a dedicated section for intellectual property rights management, detailing ownership models, licensing agreements, and protection strategies for each ER. It emphasizes securing IP while facilitating collaboration among project partners.
- **Section 4: Preliminary Market & Competition Analysis** – This section explores the potential market segments relevant to URBREATH's technologies, assessing competitive dynamics and

identifying market entry and positioning opportunities. This analysis is crucial for mapping out the commercialization landscape for each ER.

- **Section 5: Socioeconomic Analysis** – This section examines the broader socioeconomic impacts of URBREATH’s ERs, including how they support policy goals like the European Green Deal¹. Subsections include:
 - **5.1 Project PESTLE Analysis** – A comprehensive analysis of the political, economic, social, technological, legal, and environmental factors influencing the project.
 - **5.2 Project SWOT Analysis** – Strengths, weaknesses, opportunities, and threats analysis for URBREATH’s ERs, identifying strategic growth and risk mitigation areas.
- **Section 6: Stakeholder Identification and Analysis** – This section identifies the primary stakeholders for each ER, including government agencies, urban planners, technology providers, environmental organizations, and community groups. The analysis outlines each stakeholder’s role, interests, and potential influence on ER adoption.
- **Section 7: Individual Exploitation Plans** – Detailed exploitation plans for each ER are presented, including commercialization pathways, integration strategies, and timelines. These plans are tailored to maximize each ER’s impact within its target market.
- **Section 8: Conclusions**—This section summarizes the key findings and strategies presented in the deliverable, emphasizing the role of URBREATH’s ERs in fostering resilient, sustainable urban environments.

¹ European Commission. (2019). The European Green Deal. Publications Office of the European Union. https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en.

2 Key Exploitable Results description according to Grant Agreement

The URBREATH project has developed a comprehensive exploitation strategy centered around nine Key Exploitable Results (KERs) to drive sustainable urban transformation and climate resilience. These KERs encompass innovative tools, methodologies, and frameworks supporting climate-neutral urban development, community engagement, and evidence-based decision-making. Together, they aim to create a robust foundation for cities to tackle the challenges posed by climate change, urban regeneration, and sustainable growth.

Each KER represents a targeted approach to urban resilience, impacting a broad spectrum of stakeholders, including scientific communities, policy-makers, industry leaders, urban planners, and civil society organizations. By creating practical, scalable solutions, URBREATH ensures its outcomes are technically advanced, economically viable, and socially inclusive. The exploitation strategy combines dissemination, commercialization, and adaptive feedback mechanisms to maximize the reach and effectiveness of each KER.

The following analysis delves into each KER, detailing its purpose, targeted impacts, and contributions to the project's overarching objectives of transforming urban areas into sustainable, resilient, and livable environments.

KER1: Communities of Practice (CoP)

This KER establishes dynamic communities of practice that promote knowledge exchange and collaborative innovation among experts and practitioners focused on urban sustainability and climate resilience. The CoP serves as a vital platform for ongoing professional development, skill enhancement, and capacity building within the urban planning sector. By engaging urban planners, local authorities, environmental organizations, and the scientific community, the CoP fosters a culture of continuous improvement and shared learning. This initiative ensures that best practices, technological advancements, and insights are effectively disseminated, accelerating the adoption of climate resilience measures across different regions and enabling cities to adapt rapidly to changing environmental conditions.

KER2: ICT Tools, Methods, and Processes for Stakeholder Engagement

This KER is centered on developing innovative ICT tools that facilitate effective engagement with diverse urban planning and development stakeholders. These tools empower citizens, businesses, and public authorities to contribute their insights, enhancing the inclusivity and responsiveness of urban development processes. By collecting real-time feedback, these ICT platforms ensure that urban initiatives reflect local communities' unique needs and perspectives. Enhanced engagement mechanisms also mitigate potential conflicts by fostering transparency and accountability, building community trust, and ensuring that the public widely supports and understands climate resilience projects.

KER3: Innovative Simulation Models for Urban Regeneration and Climate Neutrality

KER3 focuses on creating advanced simulation models that allow urban planners to predict the outcomes of urban regeneration projects, assessing their impact on climate neutrality and resilience. These models will enable data-driven decision-making by presenting a range of scenarios and visualizations which illustrate the potential effects of various strategies on urban sustainability. Planners can use these simulations to evaluate the effectiveness of different climate mitigation measures, helping to identify the most suitable solutions for each urban context. This predictive capability supports resource optimization and helps policymakers and urban planners implement strategies that align with climate goals and urban sustainability standards.

KER4: Advanced Digital Twins with Participatory Urban Planning Functionalities

The development of digital twins marks a significant technological advancement in urban planning, providing a digital representation of physical environments that enhances participatory planning processes. These digital twins facilitate more transparent and collaborative planning and have functionalities that allow stakeholders' involvement. Citizens and stakeholders can visualize and interact with proposed urban developments, offering feedback and gaining insight into the planning decisions that affect their communities. This enhanced level of engagement promotes accountability and fosters a shared sense of responsibility for sustainable urban development, aligning urban growth with the needs and aspirations of residents.

KER5: Services, Models, and Tools for Climate Effect Impact Assessment

KER5 provides cities with robust tools and models to accurately assess the impacts of various climate interventions, supporting effective monitoring and evaluation of climate resilience strategies. These tools enable municipalities to measure the effectiveness of their actions against key performance indicators, helping to ensure that resources are allocated efficiently and adjustments are made as needed. By facilitating a continuous assessment of climate impact, these tools empower urban authorities to refine their strategies, ensuring that climate interventions deliver tangible benefits in reducing environmental risks, improving public health, and enhancing urban resilience.

KER6: Innovative Clustering of NBS and Hybrid Approaches

This KER focuses on integrating Nature-based Solutions (NBS) with hybrid technological approaches to maximize climate resilience in urban areas. By clustering NBS with engineered solutions, this approach harnesses the combined strengths of natural and technological interventions, enhancing their cumulative environmental, economic, and social benefits. For example, hybrid approaches integrating green infrastructure with renewable energy systems create multi-functional urban spaces that mitigate climate risks, promote biodiversity, provide recreational areas, and contribute to local economies. This innovative clustering method offers a holistic approach to urban resilience, supporting cities in achieving sustainable, climate-resilient growth.

KER7: NBS Evidence-Based Impact Assessment and Evaluation Framework

The evidence-based impact assessment framework provided by KER7 enables cities to evaluate the effectiveness of Nature-based Solutions (NBS) on urban environments. This framework includes methodologies for measuring outcomes such as biodiversity improvements, ecosystem services, and socio-economic benefits. By providing quantitative data on the impacts of NBS, this framework supports the broader adoption of nature-based strategies in urban planning. It also strengthens the evidence base for investing in NBS, helping policymakers and planners make informed decisions that align with environmental and economic objectives.

KER8: URBREATH Replication Methodology

KER8 introduces a structured methodology for replicating successful practices and technologies across diverse urban contexts. This replication methodology is essential for scaling the project's impact, allowing other cities and regions to implement proven strategies tailored to their unique needs. By creating a clear framework for adaptation and replication, URBREATH ensures that its solutions can be widely adopted, promoting resilience and sustainability on a larger scale. This methodology also supports cross-regional collaboration, encouraging cities to share insights and coordinate on climate resilience measures that transcend municipal boundaries.

KER9: Novel Business Models

This KER focuses on developing innovative business models to support the commercialization and sustainability of urban development technologies. These business models address key aspects such as economic viability, scalability, and integrating roles for the public and private sectors. By defining clear revenue streams and investment strategies, these models facilitate the long-term sustainability of climate resilience solutions. Additionally, the business models provide a framework for partnerships between cities, businesses, and investors, helping to attract funding and drive the market uptake of sustainable urban development technologies.

Strategic Exploitation of KERs

The URBREATH project's exploitation strategy emphasizes targeted dissemination, stakeholder engagement, and commercialization activities. By tailoring communication efforts to specific KERs and audiences, the project aims to reach and influence key stakeholders across different sectors, including academia, industry, urban development, and policymaking. This approach involves academic publications, workshops, and direct engagement with urban developers and policymakers to build awareness and drive the adoption of URBREATH solutions. Through this strategic exploitation of results, each KER contributes to advancing urban resilience and sustainability and aligns with broader European goals such as the European Green Deal and the Climate-neutral and Smart Cities Mission².

² European Commission. (2020). 100 Climate-neutral cities by 2030 – by and for the citizens. Publications Office of the European Union. https://research-and-innovation.ec.europa.eu/knowledge-publications-tools-and-data/publications/all-publications/100-climate-neutral-cities-2030-and-citizens_en.

The project's exploitation approach is adaptive, with mechanisms for continuous feedback and evolution based on stakeholder insights and market trends. This iterative model ensures that URBREATH remains relevant and impactful in transforming urban areas into sustainable, resilient, and livable environments.

2.1 Exploitable Results

The URBREATH project has identified nineteen key Exploitable Results (ERs) to support sustainable urban development and climate resilience. Each ER represents a specific innovation or solution developed within the project, ranging from software tools to datasets and methodologies. This structured analysis categorizes each ER based on ownership, technology readiness level (TRL), commercial potential, and specific strengths, weaknesses, opportunities, and threats (SWOT). This approach allows for a comprehensive exploitation strategy tailored to the project's innovations, ensuring that each ER contributes effectively to URBREATH's goals.

The following section provides a detailed overview of the main Exploitable Results identified within URBREATH, examining each ER's commercialization potential, market opportunities, and strategic pathways for integration and deployment.

ER1: Communities of Practice (CoP)

- **Category:** Collaborative Network
- **Description:** Establishes a network for urban sustainability professionals to share knowledge and best practices.
- **Owner:** SITMP
- **Exploitation Potential:** High, as it fosters continuous engagement among urban stakeholders.
- **Strengths:** Facilitates knowledge exchange; builds stakeholder networks.
- **Weaknesses:** Requires active participation and regular engagement to remain effective.
- **Opportunities:** Rising interest in collaborative urban resilience networks.
- **Threats:** Competing networks and resource constraints.
- **Target Market:** Urban planners, policymakers, municipalities.

ER2: ICT Tools for Stakeholder Engagement

- **Category:** Software
- **Description:** Smartphone application that enables stakeholder engagement and decision-making participation.
- **Owner:** TEL
- **TRL Start/End:** 5/6
- **Exploitation Potential:** High, as it empowers public involvement in city planning.
- **Strengths:** Promotes transparency; encourages proactive citizen participation.
- **Weaknesses:** Integration challenges with existing municipal applications.
- **Opportunities:** Increased demand for mobile engagement tools in urban planning.
- **Threats:** Competition from existing engagement apps.
- **Target Market:** Citizens, municipal authorities, and local businesses.

ER3: Innovative Simulation Models for Urban Regeneration

- **Category:** Model/Simulation

- **Description:** Predictive models assessing the impact of urban regeneration on climate neutrality.
- **Owner:** To be confirmed
- **Exploitation Potential:** High, supporting data-driven urban planning.
- **Strengths:** Enables informed decision-making for climate-neutral urban projects.
- **Weaknesses:** Dependence on accurate input data.
- **Opportunities:** Increasing demand for sustainable urban regeneration tools.
- **Threats:** Competition from other simulation software.
- **Target Market:** Urban planners and environmental organizations.

ER4: Advanced Digital Twins for Urban Planning

- **Category:** Digital Twin
- **Description:** A participatory planning tool using digital twin technology to model neighborhood restructuring.
- **Owner:** To be confirmed
- **Exploitation Potential:** Significant for public sector planning.
- **Strengths:** Enhances public input in planning processes.
- **Weaknesses:** High data and resource requirements.
- **Opportunities:** Expansion within smart city initiatives.
- **Threats:** Competition from other digital twin platforms.
- **Target Market:** Local governments, architects, and urban developers.

ER5: Climate Impact Assessment Dataset

- **Category:** Dataset
- **Description:** High-resolution dataset with climate scenarios for city-level climate impact assessment.
- **Owner:** FIC
- **TRL Start/End:** 7/8
- **Exploitation Potential:** Accurate climate data is essential for policy planning.
- **Strengths:** High accuracy with up-to-date data.
- **Weaknesses:** Limited observed data in certain areas.
- **Opportunities:** Increased climate adaptation in infrastructure and policy.
- **Threats:** Free data models available from public sources.
- **Target Market:** Public institutions, private sectors, and insurance companies.

ER6: Innovative Clustering of NBS and Hybrid Approaches

- **Category:** Model/Methodology
- **Description:** Clustering models for Nature-Based Solutions (NBS) to improve urban climate neutrality.
- **Owner:** To be confirmed
- **Exploitation Potential:** High, due to urban climate adaptation demand.
- **Strengths:** Offers integrated, sustainable urban solutions.

- **Weaknesses:** Limited standardization across regions.
- **Opportunities:** Growing focus on sustainable urban planning.
- **Threats:** Variability in NBS effectiveness.
- **Target Market:** Municipalities, environmental agencies, and urban planners.

ER7: NBS Evidence-Based Impact Assessment Framework

- **Category:** Methodology
- **Description:** An assessment tool for monitoring NBS impacts across environmental, social, and economic metrics.
- **Owner:** STUT & IAO
- **TRL Start/End:** 1/6
- **Exploitation Potential:** High, aligning with NBS growth trends.
- **Strengths:** Multiperspective assessment.
- **Weaknesses:** Lack of proven track record.
- **Opportunities:** Adoption by cities focusing on evidence-based sustainability.
- **Threats:** Data availability and long-term monitoring challenges.
- **Target Market:** Policymakers, urban planners, and researchers.

ER8: URBREATH Replication Methodology

- **Category:** Methodology
- **Description:** Structured methodology replicating URBREATH's results across different urban settings.
- **Owner:** SITMP
- **Exploitation Potential:** High, as it enables scalability of successful urban resilience solutions.
- **Strengths:** Supports widespread adaptation and scalability.
- **Weaknesses:** Requires customization per urban context.
- **Opportunities:** Growing interest in adaptable climate resilience models.
- **Threats:** Varying regulatory environments.
- **Target Market:** Municipalities, urban planning consultancies.

ER9: Novel Business Models

- **Category:** Business Model
- **Description:** Innovative business models designed for sustainable urban solutions.
- **Owner:** To be confirmed
- **Exploitation Potential:** High for commercialization and scaling.
- **Strengths:** Enables economic sustainability of urban resilience initiatives.
- **Weaknesses:** Dependent on economic feasibility.
- **Opportunities:** Public-private partnerships for urban sustainability.
- **Threats:** Competition from other sustainable business models.
- **Target Market:** Local governments, private investors, NGOs.

ER10: Dynamic Layer Plugin

- **Category:** Software Plugin
- **Description:** Extends VC Map by dynamically adding data layers for urban planning.
- **Owner:** VCS
- **TRL Start/End:** 1/9
- **Exploitation Potential:** High for dynamic data management in urban planning.
- **Strengths:** Real-time data updates.
- **Weaknesses:** Dependence on external data sources.
- **Opportunities:** Integration in digital city maps.
- **Threats:** Competing dynamic mapping tools.
- **Target Market:** Smart city developers and municipalities.

ER11: NBS Extension for VC Planner

- **Category:** Software
- **Description:** Adds NBS planning capabilities to the VC Planner.
- **Owner:** VCS
- **TRL Start/End:** 1/7
- **Exploitation Potential:** High for NBS-focused urban planning.
- **Strengths:** Facilitates NBS integration in planning.
- **Weaknesses:** Limited adoption of VC Planner in some regions.
- **Opportunities:** Growth of NBS in urban development.
- **Threats:** Competing urban planning tools.
- **Target Market:** Urban planners and environmental NGOs.

ER12: WMS-Time

- **Category:** Software
- **Description:** Adds time-dependent Web Map Service layers to VC Map.
- **Owner:** VCS
- **TRL Start/End:** 1/9
- **Exploitation Potential:** High, valuable for temporal mapping needs.
- **Strengths:** Real-time data visualization.
- **Weaknesses:** Requires regular data updates.
- **Opportunities:** Expansion in environmental monitoring.
- **Threats:** Existing WMS solutions.
- **Target Market:** Environmental agencies and city planners.

ER13: NBS Registry

- **Category:** Software Platform
- **Description:** Central registry for NBS project data.
- **Owner:** ATC
- **TRL Start/End:** 6/7
- **Exploitation Potential:** High for NBS monitoring and benchmarking.
- **Strengths:** Enables NBS project tracking.

- **Weaknesses:** Variability in data quality.
- **Opportunities:** Integration with other smart city platforms.
- **Threats:** Competition from similar databases.
- **Target Market:** Local governments, NGOs, and policymakers.

ER14: Dashboard Visualization

- **Category:** Software
- **Description:** Provides a real-time graphical interface for tracking urban metrics.
- **Owner:** ATC
- **TRL Start/End:** 6/7
- **Exploitation Potential:** High in decision-support tools.
- **Strengths:** Real-time KPI tracking.
- **Weaknesses:** Maintenance and data refresh needs.
- **Opportunities:** Integration with AI/IoT.
- **Threats:** Crowded dashboard market.
- **Target Market:** Local governments and policy makers.

ER15: AI Model for Quality of Life Prediction

- **Category:** AI Model
- **Description:** Predicts well-being scores based on urban factors.
- **Owner:** ATC
- **TRL Start/End:** 6/7
- **Exploitation Potential:** High for wellness planning.
- **Strengths:** Data-driven urban quality assessments.
- **Weaknesses:** Dependent on comprehensive data.
- **Opportunities:** Expansion to various sectors.
- **Threats:** Budget limitations in public sectors may limit investment in well-being assessments.
- **Target Market:** Urban planners, government agencies, and wellness organizations.
- **Path to Market:** Integration into urban planning tools, service expansion in quality of life assessments.

ER16: KPI Manager

- **Category:** Software
- **Description:** A tool for defining, managing, and computing Key Performance Indicators (KPIs) for urban environments.
- **Owner:** ENG
- **TRL Start/End:** 4/7
- **Exploitation Potential:** High, valuable for policymakers and city managers to monitor urban indicators.
- **Strengths:** It simplifies KPI management and has a user-friendly interface.
- **Weaknesses:** Requires some minimum technical skills for practical use.
- **Opportunities:** Potential to expand into various domains beyond urban monitoring.

- **Threats:** Budget constraints in public sectors.
- **Target Market:** Policy makers, urban planners, and city administrators.
- **Path to Market:** Potential integration into ENG's Digital Enabler suite for smart city solutions.

ER17: Online E-Participation Tool

- **Category:** Software
- **Description:** A web-based tool to enhance communication and engagement among stakeholders in urban planning.
- **Owner:** ENG
- **TRL Start/End:** 3/5
- **Exploitation Potential:** High, as it supports participatory processes in municipalities.
- **Strengths:** Engages stakeholders and promotes data-driven interactions.
- **Weaknesses:** Requires active stakeholder engagement strategies.
- **Opportunities:** Potential use in domains outside urban planning.
- **Threats:** Competition from other e-participation platforms.
- **Target Market:** Municipalities, policymakers, and urban planners.
- **Path to Market:** Expansion of service portfolio; integration into ENG's Digital Enabler suite.

ER18: AI Model for Flood Risk Assessment and Predictive Monitoring

- **Category:** AI Model
- **Description:** A predictive model for flood risk assessment to improve flood management and monitoring.
- **Owner:** EXUS
- **TRL Start/End:** 2/6
- **Exploitation Potential:** High, due to rising demand for climate resilience tools.
- **Strengths:** Uses large datasets for accurate flood predictions.
- **Weaknesses:** Dependence on real-time data may not always be available.
- **Opportunities:** High interest in flood risk management tools across various sectors.
- **Threats:** Competition from other AI-based predictive tools; regulatory impacts on data usage.
- **Target Market:** Local governments, insurance providers, and utility companies.
- **Path to Market:** Integration in EXUS's FinTech product EFS; commercialization across EXUS's global network.

ER19: Visual Interpretable and Explainable AI (VIE-AI) Tool

- **Category:** Software
- **Description:** A prototype tool enhancing AI model transparency and interpretability.
- **Owner:** EXUS
- **TRL Start/End:** 5/7
- **Exploitation Potential:** High, as there is an increasing need for transparent AI in regulated sectors.
- **Strengths:** Builds trust by providing insights into AI decision-making processes.
- **Weaknesses:** Relies on the quality of input AI models.

- **Opportunities:** Increasing demand for explainable AI, particularly in finance, insurance, and government sectors.
- **Threats:** Evolving AI regulations may impact development and deployment.
- **Target Market:** Municipal governments, insurance, finance, urban management.
- **Path to Market:** Incorporation into EXUS's products and marketed globally as an AI transparency tool.

2.1.1 Combined SWOT Analysis of URBREATH Exploitable Results (ERs)

The URBREATH project has developed 19 unique Exploitable Results (ERs) that address various aspects of urban sustainability, climate resilience, stakeholder engagement, and advanced technology integration. Together, these ERs form a robust toolkit for promoting sustainable urban environments and enhancing cities' resilience to climate change. The following analysis synthesizes the key features, market potential, and strategic insights across all ERs, providing a cohesive view of how these innovations can drive meaningful impact in urban planning and climate adaptation.

Strengths

- **Diverse Technological Solutions:** The ERs encompass various technologies, from software and AI models to datasets and digital twins, offering holistic solutions for urban climate resilience. This variety allows URBREATH to address complex urban challenges with tailored tools that can be adapted to different contexts.
- **High-Resolution Data and Predictive Capabilities:** Several ERs, such as the Climate Impact Assessment Dataset and AI models for flood risk and quality of life prediction, leverage high-resolution data and predictive analytics. These capabilities enable data-driven decision-making, supporting more accurate urban planning and disaster preparedness.
- **Emphasis on Stakeholder Engagement:** ERs, like the ICT tools for stakeholder engagement, the online e-participation tool, and the Communities of Practice (CoP), focus on engaging citizens, urban planners, and policymakers. This participatory approach promotes transparency, fosters community involvement, and encourages adoption by creating solutions that meet diverse stakeholder needs.
- **Alignment with Global Climate Goals:** The project's solutions align with the European Green Deal, the UN Sustainable Development Goals (SDGs)³, and other international climate policies. This alignment enhances the ERs' appeal to policymakers and increases the likelihood of public sector adoption.
- **Scalability and Adaptability:** ERs such as the URBREATH Replication Methodology and the NBS Registry are designed to be scalable across various urban settings, making them applicable to cities of different sizes and resource levels. This flexibility allows for wider adoption across regions and increases the ERs' impact potential.

³ United Nations. (2015). Transforming our world: The 2030 Agenda for Sustainable Development. United Nations General Assembly. <https://sdgs.un.org/2030agenda>.

Weaknesses

- **High Dependence on Quality Data and Technology Infrastructure:** Many ERs rely on real-time data, high-resolution datasets, and advanced technology infrastructure, which may be limited in specific regions or cities. This dependency could hinder adoption in less developed or resource-constrained areas.
- **Integration Challenges with Existing Systems:** Several ERs, mainly digital twin technologies and stakeholder engagement tools, may face challenges integrating with municipal systems or platforms. This integration complexity could slow down deployment and increase technical support requirements.
- **Resource-Intensive Implementation:** Implementing high-tech solutions like AI models and digital twins requires significant resources, including skilled personnel, funding, and time. This may present a barrier to adoption for some municipalities, mainly where budget constraints exist.
- **Need for Regular Updates and Maintenance:** ERs that rely on dynamic data, such as the Dashboard Visualization and Climate Impact Dataset, require ongoing updates to maintain relevance and accuracy. This could increase operational costs and create challenges in ensuring sustained engagement and funding.

Opportunities

- **Growing Demand for Climate Adaptation Solutions:** Climate change's impacts on urban areas have spurred demand for tools and methodologies that enhance resilience. ERs focused on flood risk assessment, climate impact modeling, and NBS offer timely solutions that cater to this demand, making URBREATH a valuable resource for cities looking to adapt to environmental challenges.
- **Expansion into Smart City Markets:** Many ERs, including the KPI Manager, Dynamic Layer Plugin, and NBS Extension for VC Planner, align with the smart city agenda by providing digital and data-driven solutions. The expansion of smart city initiatives worldwide creates opportunities for these ERs to become integral parts of urban digital infrastructure.
- **Policy Support and Funding for Sustainable Urban Development:** National and regional policies that promote sustainable development and climate resilience, especially in the EU, create a favorable environment for URBREATH's solutions. Public funding opportunities and policy support could facilitate the widespread adoption and implementation of these ERs.
- **Cross-Sector Application Potential:** Beyond urban planning, several ERs, such as the AI models for quality of life and flood risk assessment, can be applied across multiple sectors, including insurance, finance, public health, and environmental monitoring. This cross-sector relevance broadens the ERs' market potential and opens diverse revenue streams.
- **Increased Public and Institutional Awareness of Climate Risks:** Rising awareness of climate-related risks drives public and private sectors to invest in resilience-building tools. URBREATH's comprehensive suite of ERs positions it as a leader in climate-resilient urban planning, offering stakeholders practical, evidence-based solutions to pressing environmental challenges.

Threats

- **Intense Market Competition:** AI, digital twins, and urban planning tools are becoming increasingly competitive, with many established companies offering similar solutions. URBREATH's ERs must differentiate themselves in a crowded marketplace to capture interest and maintain relevance.
- **Regulatory and Data Privacy Challenges:** New data privacy and AI regulations are emerging worldwide, particularly within the EU (e.g., GDPR). Compliance becomes critical for ERs that rely on data collection and processing. Navigating these regulations can pose challenges, especially for ERs involving citizen data or sensitive environmental information.
- **Economic Constraints and Budget Cuts in Public Sector:** Economic uncertainties, including inflation and budget cuts, may limit public sector investment in new technologies and urban planning tools. This could affect the adoption rate of URBREATH's ERs, particularly those with high implementation costs.
- **Dependence on Long-Term Stakeholder Engagement:** Maintaining consistent stakeholder engagement is essential for ERs focused on participatory processes, such as the ICT tools and e-participation platforms. If engagement declines, the effectiveness of these tools could be compromised.
- **Rapid Technological Advancements:** Technological advancements happen rapidly in fields like AI and environmental modeling, potentially rendering existing solutions outdated. URBREATH's ERs must evolve continuously to stay competitive and relevant in an innovation-driven marketplace.

2.1.2 Combined Exploitation Strategy and Market Positioning

Effective market positioning and exploitation strategies are critical for maximizing the impact and adoption of URBREATH's Exploitable Results (ERs). By targeting key market segments, forming strategic partnerships, emphasizing evidence-based methodologies, and exploring related markets, URBREATH can address diverse stakeholder needs in urban planning, environmental resilience, and beyond. Continuous innovation and adaptation further ensure that its solutions remain competitive and aligned with the evolving demands of a dynamic marketplace.

- **Targeted Market Segments:** The ERs collectively target a broad market, including local governments, urban planners, environmental agencies, insurance companies, and NGOs. By focusing on specific sectors, such as smart cities, environmental monitoring, and climate resilience, URBREATH can position its ERs as essential tools for cities and organizations committed to sustainable development.
- **Strategic Partnerships:** Forming partnerships with smart city initiatives, governmental agencies, and environmental organizations can amplify the reach and impact of URBREATH's ERs. Collaborations with these entities can also help integrate the ERs into existing urban planning frameworks, facilitating faster adoption.

- **Differentiation through Evidence-Based Impact:** URBREATH's ERs are grounded in data-driven methodologies, high-resolution environmental modeling, and participatory engagement, differentiating them from generic urban planning tools. By emphasizing the evidence-based approach of its ERs, URBREATH can attract municipalities and organizations seeking scientifically validated solutions.
- **Expanding into Related Markets:** Beyond urban planning, the ERs have applications in sectors like public health, insurance, and finance. For example, the flood risk assessment and quality of life AI models can be marketed to insurance providers and wellness organizations, respectively, expanding URBREATH's revenue potential.
- **Continuous Innovation and Market Adaptation:** URBREATH should focus on continuous R&D and innovation within its ERs to mitigate threats from rapid technological advancements and intense competition. Regular updates, enhanced features, and new functionalities will keep URBREATH's solutions relevant and competitive in a dynamic market.

3 IPR management

The URBREATH project's IPR management strategy is designed to safeguard intellectual property while promoting structured knowledge sharing and enabling the commercial scalability of project outcomes. The plan centers around:

- **Clear Ownership Definition:** Each IP asset is attributed to its rightful contributor(s), and transparent agreements regarding ownership, rights, and obligations facilitate collaboration and the resolution of potential disputes.
- **Protective Measures:** The project employs a proactive approach to identifying, classifying, and protecting assets using patents, copyrights, trade secrets, and licensing arrangements.
- **Dissemination Protocols:** Well-defined dissemination policies guide information-sharing practices across consortium members, stakeholders, and the public, ensuring IP integrity and compliance with proprietary rights.
- **Commercialization Support:** Designed to align with URBREATH's market-driven goals, the strategy includes frameworks for establishing business models, IP value assessment, and partnerships to promote real-world implementation of project results.

The IPR strategy ensures that URBREATH's innovations are safeguarded within the consortium, respecting each partner's contributions and preparing the project for post-completion scaling and commercial viability. The dynamic approach also adapts to ongoing technological and market developments, ensuring the relevance of IPR protection mechanisms over time.

3.1 Types of Knowledge

The URBREATH project produces diverse types of knowledge, each with unique IP requirements and management needs:

- **Technical Knowledge:** This includes specialized methodologies, processes, digital tools, and simulation models for urban planning, stakeholder engagement, and climate resilience. Given its potential market value, technical knowledge is protected through patents and copyrights, limiting its availability to approved stakeholders.
- **Process Knowledge:** The project's frameworks for climate resilience assessment, stakeholder engagement models, and replicable urban planning methodologies fall under process knowledge. While partially shared in open-access formats to encourage widespread adoption, critical aspects are safeguarded as trade secrets, ensuring URBREATH's competitive advantage in urban sustainability.
- **Scientific Knowledge:** Scholarly publications, technical reports, research articles, and findings contribute to scientific knowledge on climate resilience and sustainable urban development. Much of this information will be published in open-access academic journals and conference proceedings to facilitate knowledge dissemination, enhancing URBREATH's visibility and impact in the scientific community.

- **Commercial Knowledge:** Commercial insights such as business models, revenue strategies, and commercialization plans are integral to scaling project outcomes. These assets are considered proprietary and are protected through copyright and licensing arrangements, shared selectively with stakeholders who have vested interests in commercialization.

Each knowledge type is evaluated for its sensitivity, relevance, and alignment with the project's dissemination goals, with protective measures to mitigate premature or unauthorized access risks.

3.2 Record of Intellectual Property Assets

URBREATH maintains a centralized Intellectual Property (IP) registry that comprehensively records all IP assets generated during the project. The IP registry includes:

- **Asset Title and Description:** Each IP entry is documented with a clear title and an in-depth description of the asset's function, intended use, and key contributors.
- **Ownership and Contributors:** The registry defines primary ownership and any co-contributing entities to clarify rights, responsibilities, and future usage permissions.
- **Protection Mechanism:** Specifies the type of IP protection applied, such as patents, copyrights, or trade secrets, along with the date of registration or filing.
- **Usage Rights and Restrictions:** Outlines terms for asset usage, including restrictions on public access, conditions for licensing, and any confidentiality agreements governing the IP.
- **Exploitation Potential:** Identifies each asset's commercial, scientific, or social applications, offering a structured basis for prioritizing high-value IPs in dissemination and commercialization efforts.

The centralized IP registry undergoes regular updates to ensure comprehensive tracking of each asset's protection status and access permissions. It is an essential tool for structured IP management and compliance within the consortium.

3.3 Ownership Schemas

Ownership of IP assets within the URBREATH project is defined at the outset, with tailored agreements based on the nature of the contribution and the asset's intended use:

- **Sole Ownership:** Assets created by individual partners are classified as sole ownership, granting exclusive rights to the originating entity. This arrangement benefits assets with limited joint development, streamlining ownership, and exploitation rights.
- **Joint Ownership:** Joint ownership agreements are established where multiple consortium members contribute significantly to an asset. These agreements outline usage rights, revenue-sharing protocols, and responsibilities for each contributing partner, promoting equitable and transparent IP management. Joint ownership enables collaborative innovation while protecting each partner's interests.
- **License Agreements:** Licensing is used when a partner requires access to an asset another partner owns. These licenses outline usage limits, fees (if applicable), and specific rights to exploit the IP within the project's scope. Licenses may be structured as commercial or non-

commercial, allowing flexibility for various applications while ensuring compliance with IP guidelines.

Ownership schemas facilitate efficient collaboration within the consortium, mitigate potential disputes, and establish a clear foundation for post-project IP usage and commercialization, aligning IP management with URBREATH's collaborative objectives.

3.4 IPR Matrix

The IPR matrix provides an overview of each Key Exploitable Result (KER), linking them with specific IP considerations:

KER	IP Type	Ownership	Protection Mechanism	Exploitation Strategy
KER1: Communities of Practice	Copyright	Consortium	Copyright	Open access (with consent)
KER2: ICT Tools for Stakeholder Engagement	Trade Secret, Copyright	Partner-specific	Licensing (commercial & non-commercial)	Internal use & licensing
KER3: Simulation Models for Urban Regeneration	Patent, Copyright	Consortium	Patent filing	Licensing & commercialization
KER4: Advanced Digital Twins	Copyright, Trade Secret	Consortium	NDA for access	Commercial licensing
KER5: Climate Effect Impact Assessment Tools	Patent, Copyright	Lead partner	Patent filing	Open access for academic, and commercial license
KER6: Innovative Clustering of NBS	Trade Secret	Partner-specific	Proprietary processes	Service-based model
KER7: NBS Impact Assessment Framework	Copyright	Lead partner	Copyright	Research & Consultancy
KER8: Replication Methodology	Copyright	Consortium	Copyright	Open-source for academic use
KER9: Novel Business Models	Trade Secret	Partner-specific	NDA	Commercial partnerships

This matrix aligns each KER with an appropriate protection mechanism and exploitation approach, serving as a roadmap for maximizing the impact of project results while ensuring IP protection.

3.5 Instruments for Project Results Protection

To secure the project's intellectual property, URBREATH employs the following IP protection instruments:

1. **Patents:** Patents are applied to inventions, technological tools, and methods that offer commercial potential. They secure exclusive rights for inventors, enabling monetization through licensing or direct commercialization.
2. **Copyrights:** Applied to written content, software, digital twins, and other creative outputs, ensuring creators retain rights over distribution, adaptation, and reproduction.
3. **Trademarks:** Protect unique project branding elements, reinforcing URBREATH's identity and differentiating it within the climate resilience and urban planning markets.
4. **Non-Disclosure Agreements (NDAs):** NDAs are extensively used in collaborations with external parties to safeguard sensitive data and prevent unauthorized dissemination.
5. **Licensing Agreements:** Formalize access permissions for specific KERS, allowing partners or third parties to use the IP within defined limits. This protects proprietary knowledge while enabling commercial and non-commercial applications.

These instruments collectively provide a multi-layered approach to IP protection, allowing URBREATH to secure its knowledge assets while facilitating controlled dissemination and collaboration.

3.6 Management of Knowledge

Knowledge management within URBREATH balances the need for collaborative sharing with IP protection requirements:

- **Dissemination Protocols:** Clear guidelines for sharing project data and findings ensure compliance with IP requirements and protect sensitive assets from unauthorized disclosure.
- **Internal Collaborative Platforms:** Secure, consortium-only platforms support knowledge exchange, research data sharing, and the development of joint deliverables while maintaining confidentiality.
- **Workshops and Training Sessions:** Internal training ensures consortium members understand IPR guidelines and effective knowledge management practices, facilitating adherence to IP protocols.

Through these mechanisms, URBREATH fosters a productive environment where knowledge can be developed and shared securely, promoting collaborative innovation.

3.7 Project Results Protection

A structured approach safeguards the results of URBREATH, ensuring long-term IP security and value retention:

- **Pre-Publication IP Review:** All results are reviewed to assess IP implications before publication or public dissemination, protecting sensitive information and preventing IP infringement.

- **IP Review Committee:** This dedicated committee conducts periodic reviews of IP status, assesses potential risks of unauthorized use, and ensures compliance with consortium IPR agreements.
- **Ongoing Monitoring and Enforcement:** URBREATH continuously monitors IP assets, tracking usage and responding to potential breaches or unauthorized exploitation, thus ensuring proactive IP management.

This comprehensive approach to project result protection ensures that URBREATH's innovations are securely managed for maximum impact, allowing for responsible use, widespread adoption, and sustainable growth in urban resilience solutions.

4 Preliminary Market & Competition Analysis

The URBREATH project operates within a rapidly evolving landscape driven by the need for urban resilience and climate adaptation. They are integrating advanced technologies, such as Nature-Based Solutions (NBS), digital twins, high-resolution environmental modeling, and AI-driven analytical tools, positions URBREATH within several high-impact market segments. This analysis explores key market segments, competitive landscape, and growth trends, identifying the opportunities and challenges for URBREATH's technologies to achieve market adoption and competitive advantage.

4.1 Key Market Trends and Growth Drivers

Global trends are increasingly pushing cities and governments toward sustainable urban planning, environmental conservation, and climate resilience solutions. Key growth drivers include:

- **Rising Urbanization:** As cities expand, urban planners are adopting smart technologies to address infrastructure demands, environmental degradation, and public health risks associated with urban density.
- **Climate Policy and Regulation:** Governments worldwide prioritize climate action, generating demand for data-driven tools to implement and monitor climate policies. Initiatives like the European Green Deal and the UN's Sustainable Development Goals (SDGs) underscore this shift.
- **Technological Advancements:** The availability of sophisticated tools, such as digital twins, AI, and high-resolution climate modeling, supports innovative approaches to urban planning and management. These technologies enable real-time monitoring and predictive analytics, aligning with smart city agendas.
- **Increased Public Awareness and Demand:** Environmental awareness is creating public pressure on governments and organizations to invest in sustainable and climate-resilient urban development.

These drivers highlight a growing opportunity for URBREATH's solutions, which leverage cutting-edge technologies to address urban challenges holistically.

4.2 Competitive Landscape

1. Smart Cities and Urban Planning

- *Market Dynamics:* The smart cities market is expected to grow substantially, driven by city governments' focus on technology-based urban management and sustainability. Competitors in this segment include established technology providers (e.g., IBM, Siemens) that offer digital twin solutions, IoT platforms, and data analytics for urban management.
- *URBREATH's Advantage:* Unlike generic solutions, URBREATH integrates NBS with digital twins and AI to offer an environmentally-focused approach to urban planning, differentiating itself with unique tools that prioritize climate resilience.

2. Environmental Management and Conservation

- *Market Dynamics*: Environmental management tools are gaining traction as cities and organizations seek to balance development with ecological sustainability. Competitors range from GIS providers to companies offering ecosystem management tools.
- *URBREATH's Advantage*: URBREATH's models are designed to specifically address the complexities of urban ecosystems, offering targeted NBS solutions to mitigate the impact of urbanization on biodiversity. This approach provides cities with tools that align with ecological objectives, creating a competitive edge in urban environmental management.

3. Public Health and Safety

- *Market Dynamics*: The public health sector integrates environmental monitoring into health and safety planning, with tools focused on air quality, extreme weather event forecasting, and heat management. Competitors include environmental sensor companies and climate data platforms.
- *URBREATH's Advantage*: By focusing on predictive analytics for urban heat islands, air quality, and extreme weather, URBREATH offers a holistic toolset for health agencies. Its integration of NBS directly links environmental factors with health outcomes, enabling proactive measures to enhance urban public health.

4. Infrastructure and Construction

- *Market Dynamics*: The construction and infrastructure market is experiencing a shift towards sustainable building practices. Competitors include firms that provide green building materials and sustainability-focused architectural solutions.
- *URBREATH's Advantage*: URBREATH's NBS-centric infrastructure models offer practical, scalable solutions for designing green infrastructure. By providing data and strategies for climate-resilient infrastructure, URBREATH aligns well with green building certification requirements and sustainability standards, distinguishing itself in the green infrastructure market.

5. Water Management

- *Market Dynamics*: Urban water management increasingly relies on sustainable stormwater, flooding, and water conservation solutions. Competitors in this space include traditional water infrastructure providers, as well as companies focused on green stormwater solutions.
- *URBREATH's Advantage*: URBREATH's integration of NBS for water management offers a natural solution to urban water resilience challenges. Unlike traditional engineered solutions, URBREATH's models support green infrastructure that enhances stormwater absorption, reduces runoff, and improves water quality, providing an innovative approach in a market historically dominated by conventional infrastructure.

6. Policymakers and Governmental Agencies

- *Market Dynamics*: Government agencies actively seek tools to support data-driven policy-making for sustainable development. The competition includes consultancies and digital platforms focused on policy analytics and climate adaptation.

- *URBREATH's Advantage:* URBREATH's data-rich models provide policymakers with comprehensive insights to craft effective policies. The project's evidence-based approach, supported by AI and high-resolution environmental modeling, positions it as a preferred choice for agencies looking to base decisions on robust environmental data.

7. Education and Research

- *Market Dynamics:* Educational and research institutions are expanding their focus on climate science and urban sustainability. Competitors in this segment include academic publications, research tools, and environmental data providers.
- *URBREATH's Advantage:* With its research-backed models and focus on NBS, URBREATH offers academic institutions and researchers access to cutting-edge tools and datasets. This strengthens the project's impact on research and education, enabling it to contribute significantly to curricula and research agendas focused on sustainable urban development.

4.3 Competitive Advantages of URBREATH Technologies

URBREATH stands out in the market by offering integrated, scalable, and environmentally focused technologies tailored to urban climate resilience. With a unique emphasis on Nature-Based Solutions (NBS), advanced AI-driven environmental modeling, and adaptability across diverse urban contexts, URBREATH provides comprehensive and innovative tools that address the growing demand for sustainable urban development:

- **Integrated Climate Resilience Solutions:** Unlike competitors focusing on isolated solutions, URBREATH provides an integrated suite of technologies, including NBS, digital twins, and AI-driven models tailored for urban climate resilience. This combination offers a holistic toolset that few competitors match, addressing multiple urban sustainability needs under a unified framework.
- **Focus on Nature-Based Solutions (NBS):** URBREATH's core strength lies in its emphasis on NBS, an area that traditional urban planning solutions often overlook. This differentiates URBREATH by providing environmentally friendly solutions that support biodiversity, ecosystem services, and resilience, responding to a niche yet expanding demand for urban sustainability.
- **AI and High-Resolution Environmental Modeling:** The project's use of AI and high-resolution modeling enables detailed, predictive insights that enhance stakeholders' decision-making. This level of precision offers a significant advantage over less sophisticated tools, positioning URBREATH as a leader in data-driven urban resilience.
- **Scalability and Adaptability:** URBREATH's solutions are designed to be scalable across various urban contexts and can be adapted to different geographic, climatic, and socio-economic settings. This adaptability broadens its market potential, making it suitable for large metropolitan areas and smaller urban regions seeking climate adaptation strategies.

4.4 Market Entry Challenges

URBREATH faces specific challenges in achieving widespread market adoption:

- **Market Fragmentation:** The urban sustainability and smart cities markets are fragmented, with many specialized solutions targeting niche problems. Navigating this landscape requires targeted marketing and positioning to communicate URBREATH's value as an integrated solution.
- **High Entry Barriers in the Public Sector:** Adoption by government agencies and public authorities can be slow due to budget constraints, regulatory processes, and political factors. URBREATH's strategy must address these barriers by showcasing long-term cost savings and aligning its offerings with policy priorities.
- **Competition from Established Players:** Established technology providers and engineering firms may compete strongly, particularly in digital twins and infrastructure sectors. URBREATH must emphasize its unique NBS focus and data-driven capabilities to differentiate itself.

4.5 Strategic Implications and Recommendations

To capitalize on its competitive advantages and overcome market entry challenges, URBREATH should consider the following strategies:

- **Partnerships with Established Smart City Initiatives:** Collaborating with existing smart city and climate resilience initiatives could accelerate URBREATH's market penetration and allow it to leverage established networks.
- **Targeted Pilot Programs:** Demonstrating URBREATH's impact through pilot programs in key cities would provide case studies and empirical data to attract additional stakeholders and funding and build credibility in the market.
- **Public Awareness and Education Campaigns:** Enhancing public understanding of the importance of NBS and urban resilience through awareness campaigns can create demand pressure, encouraging municipalities to adopt URBREATH's solutions.
- **Focus on High-Impact Markets:** Prioritizing markets such as public health, urban planning, and water management, where URBREATH's competitive advantages are strongest, will help establish a foothold before expanding into broader market segments.

5 Socioeconomic analysis

5.1 Project PESTLE analysis

The URBREATH project operates in a complex and evolving landscape shaped by multiple external factors influencing its development, adoption, and market success. To assess these influences, a PESTLE (Political, Economic, Social, Technological, Legal, and Environmental) analysis provides a structured overview of the external environment surrounding the project. Each factor sheds light on potential opportunities and challenges for URBREATH, from policy and economic drivers to technological advancements and environmental priorities. By understanding these factors, URBREATH can strategically position its solutions to meet market demands, align with regulatory requirements, and maximize impact in the growing field of urban resilience and sustainable development.

The following analysis explores the six PESTLE dimensions as they apply to URBREATH. It offers insights into how external forces shape the project's path toward achieving climate-resilient and sustainable urban environments.

Political

- **Government Policies on Climate Action:** With international agreements such as the Paris Agreement⁴, governments globally are implementing policies to reduce carbon emissions and mitigate climate change. For example, the EU's European Green Deal promotes sustainable urban development and climate resilience. URBREATH aligns well with these goals, potentially attracting government support, funding, and policy backing.
- **Local and Regional Urban Planning Regulations:** Urban planning policies vary across cities and regions, influencing the adoption of URBREATH's technologies. Municipal support for smart cities and resilience-building can enhance URBREATH's implementation, while regions with strict zoning laws or bureaucratic hurdles might slow adoption.
- **Political Stability and Support for Innovation:** Governments in politically stable regions are more likely to support long-term projects such as climate resilience and urban sustainability. However, political changes or unstable regions could disrupt project continuity and reduce funding opportunities for innovative solutions like URBREATH.

Economic

- **Funding and Investment in Urban Sustainability:** Global investment in green technologies and climate adaptation is rising, with increasing funding from governments, EU programs, and

⁴ United Nations. (2015). Paris Agreement. United Nations Framework Convention on Climate Change. https://unfccc.int/sites/default/files/english_paris_agreement.pdf.

private sectors. The economic potential of URBREATH's solutions appeals to investors focused on sustainable development and could create ample funding avenues.

- **Cost-Benefit Advantage of Nature-Based Solutions (NBS):** NBS often present a cost-effective alternative to traditional infrastructure solutions, providing economic and ecological benefits. URBREATH's focus on NBS can make its solutions attractive to cash-strapped municipalities and cities facing tight budgets.
- **Economic Recovery from COVID-19 and Inflation:** Economic uncertainty stemming from global events like the pandemic and inflation may impact municipal budgets and reduce spending on sustainability initiatives. However, opportunities for projects aligned with economic resilience and job creation may arise as economies recover and stimulus packages include sustainability.

Social

- **Increasing Public Awareness of Climate Change:** Rising public concern drives demand for sustainable solutions. Cities are under pressure to implement resilient urban planning, which URBREATH's solutions directly address. Public support for such initiatives may encourage governmental and corporate stakeholders to adopt URBREATH's tools.
- **Urbanization and Population Growth:** Urban areas are expanding rapidly (European Environment Agency, 2020; European Commission, 2021; European Environment Agency, 2023), creating challenges related to infrastructure, pollution, and climate resilience. URBREATH's tools support sustainable urban growth, meeting the demands of city planners and residents who seek livable, resilient environments.
- **Community Engagement and Participatory Planning:** Social trends emphasize inclusive and participatory urban planning. URBREATH's digital twin technology and stakeholder engagement tools align with this trend by enabling community input, fostering a sense of ownership, and supporting social acceptance of urban projects.

Technological

- **Advancements in Digital Twins and AI:** Rapid progress in AI, IoT, and digital twin technology enables more sophisticated, real-time urban planning tools. URBREATH leverages these technologies to model, analyze, and enhance urban resilience, positioning itself at the forefront of smart city innovation.
- **Integration of Big Data and Environmental Modeling:** The capacity to collect, process, and analyze environmental data at high resolution supports the effectiveness of URBREATH's solutions. Advances in data analytics and environmental monitoring will further enhance the project's impact, accuracy, and scalability.
- **Barriers to Technological Adoption:** While advanced technologies provide numerous benefits, some municipalities may lack the infrastructure or expertise to implement them fully. This may require URBREATH to offer technical support, training, or partnerships with local technology providers to facilitate adoption.

Legal

- **Data Privacy and Protection Regulations:** URBREATH’s digital solutions, particularly those involving community data, must comply with regulations like GDPR to ensure user privacy and data protection. Compliance is essential to avoid legal issues and maintain public trust.
- **Intellectual Property Rights (IPR):** URBREATH’s innovative tools and technologies require robust IP protection to safeguard against unauthorized use. IP management is critical for securing competitive advantages and ensuring competitors do not exploit proprietary innovations.
- **Environmental and Sustainability Regulations:** As regulations on urban sustainability tighten, cities are increasingly incentivized to adopt green infrastructure. URBREATH’s alignment with sustainability standards (such as EU climate policies) can support regulatory compliance and enhance the attractiveness of its solutions for municipalities.

Environmental

- **Climate Change and Extreme Weather Events:** With the increasing frequency of extreme weather events (e.g., heatwaves, flooding), cities prioritize climate resilience. URBREATH’s focus on NBS and high-resolution climate modeling is directly relevant, offering cities tools to plan for and mitigate environmental risks.
- **Biodiversity Conservation and Ecosystem Services:** The focus on biodiversity and ecosystem services in urban planning aligns with URBREATH’s Nature Based Solutions. This supports environmental sustainability by protecting urban ecosystems, providing cities with tangible environmental benefits, and attracting eco-conscious stakeholders.
- **Global Push for Sustainability and Carbon Reduction:** URBREATH is well-positioned to benefit from the global shift towards sustainability as cities and private enterprises commit to reducing their carbon footprints. Projects contributing to carbon reduction through NBS and green infrastructure will continue to gain priority, reinforcing URBREATH’s market relevance.

5.2 Project SWOT analysis

The URBREATH project is designed to create sustainable, climate-resilient urban environments through innovative technologies, including Nature-Based Solutions (NBS), digital twins, high-resolution environmental modeling, and AI-driven analytics. As URBREATH aims to address urban sustainability and resilience challenges, it is essential to analyze its internal strengths and weaknesses alongside external opportunities and threats. A SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis provides a strategic overview of URBREATH’s position, highlighting the factors that can enhance or hinder its success. This analysis helps URBREATH capitalize on its strengths, address potential weaknesses, and strategically respond to external opportunities and threats within the urban sustainability landscape.

The following SWOT analysis examines the internal and external factors that could impact URBREATH’s ability to achieve its objectives and maximize its influence on urban climate resilience.

Strengths

- **Innovative Use of Nature-Based Solutions (NBS):** URBREATH's strong emphasis on NBS provides a unique, eco-friendly approach to urban resilience that aligns with growing global trends in green infrastructure and biodiversity conservation.
- **Integration of Advanced Technologies:** The combination of digital twins, high-resolution environmental modeling, and AI-driven tools equips URBREATH with robust capabilities for accurate analysis, prediction, and management of urban climate challenges, setting it apart from traditional urban planning solutions.
- **Comprehensive Stakeholder Engagement Tools:** URBREATH's tools for involving stakeholders enhance public engagement, transparency, and community support. This participatory approach aligns with current social demands for inclusive urban planning and helps build trust and buy-in from local communities.
- **Strong Alignment with EU and Global Climate Goals:** URBREATH's objectives resonate well with significant climate policies, including the European Green Deal and the UN Sustainable Development Goals (SDGs), which enhances its appeal to government bodies and funding institutions.
- **Scalability and Flexibility:** URBREATH's solutions are adaptable across different urban contexts, making them scalable from local municipalities to larger metropolitan areas. This flexibility increases its potential for wide adoption across diverse regions.

Weaknesses

- **High Dependence on Advanced Technology Infrastructure:** URBREATH's reliance on digital twins, AI, and other advanced technologies may pose challenges in cities or regions with limited technological infrastructure, potentially restricting adoption in less technologically developed areas.
- **Resource-Intensive Implementation:** Implementing high-resolution models and NBS projects can be resource-intensive, requiring significant funding, skilled personnel, and time. This may limit URBREATH's accessibility for cities with constrained budgets.
- **Complexity of Stakeholder Coordination:** Engaging diverse stakeholders and maintaining participatory planning processes can be challenging and time-consuming, particularly in large-scale urban projects. Effective stakeholder coordination requires careful management to avoid potential conflicts and delays.
- **Intellectual Property (IP) Management:** With multiple innovations and IP assets in development, URBREATH must effectively manage IP rights across consortium partners. Any gaps in IP management could complicate commercialization and limit IP protection.
- **Market Awareness and Outreach Needs:** As a newer, innovative approach, URBREATH may need to increase market awareness of its specific benefits and applications, especially for non-technical audiences, to ensure broader understanding and adoption.

Opportunities

- **Growing Demand for Climate-Resilient Cities:** The increasing impact of climate change on urban areas has led to a rising demand for solutions that promote urban resilience. URBREATH is well-positioned to meet this demand, especially as more cities commit to climate adaptation and mitigation strategies.
- **Increased Investment in Green and Smart Cities:** With governments and private sectors investing heavily in sustainable urban development, URBREATH can leverage this funding trend to secure partnerships and financial support for pilot programs and scalable deployments.
- **Advances in AI, IoT, and Digital Twin Technologies:** Continued advancements in AI, IoT, and digital twin technology can enhance URBREATH's solutions, allowing for more precise and efficient data analysis, predictive modeling, and real-time monitoring, strengthening the project's technological foundation.
- **Policy Support and Incentives for Sustainable Development:** Supportive policies, such as tax incentives for green infrastructure and funding for climate resilience projects, create favorable conditions for URBREATH's adoption as cities seek to comply with new environmental regulations.
- **Public Awareness and Advocacy for Climate Action:** Growing public awareness and advocacy for sustainable practices allow URBREATH to engage citizens who are already motivated to support eco-friendly and resilient urban planning solutions.

Threats

- **Intense Competition from Established Players:** The urban sustainability and smart cities markets are competitive, with established companies offering similar tools and technologies. To stand out, URBREATH must differentiate itself and highlight its unique focus on NBS and climate resilience.
- **Regulatory and Compliance Challenges:** Variations in local and regional regulations can create barriers to implementation, especially when privacy laws, data protection standards, and environmental regulations may vary significantly between regions.
- **Potential Economic Constraints:** Economic challenges, such as inflation or budget cuts in the public sector, could reduce funding for sustainability projects, limiting the budget cities can allocate for adopting URBREATH's solutions.
- **Risk of Slow Technology Adoption:** Municipalities, particularly in smaller or less technologically advanced regions, may be slow to adopt new technologies due to budget limitations, lack of expertise, or bureaucratic processes, which could hinder URBREATH's penetration in specific markets.
- **Dependency on Government Support and Funding:** Many urban sustainability projects rely on government funding, which can be unpredictable and subject to political shifts. Changes in government priorities or funding allocations could affect URBREATH's ability to secure consistent financial support.

6 Stakeholder identification and analysis

The URBREATH project brings together many stakeholders, each playing a critical role in supporting, adopting, and advocating for the project's sustainable urban development and climate resilience goals. This section identifies key stakeholders, analyzes their interests and influence on the project, and outlines their expected contributions and benefits from URBREATH's success. Understanding each stakeholder's role enables effective collaboration and communication strategies that align project outcomes with stakeholder needs.

6.1 Types of Stakeholder Characterization

URBREATH's stakeholders can be categorized into the following types based on their roles, influence, and impact on the project:

- **Customers:** The primary users and beneficiaries of URBREATH's solutions, such as municipalities, urban planners, and environmental agencies, who apply the project's tools and technologies to enhance urban sustainability and resilience.
- **Suppliers and Technology Providers:** Organizations that supply the necessary technological components, software, and infrastructure to implement URBREATH's solutions. These stakeholders support the company by providing advanced hardware, digital tools, and technical services.
- **Owners and Project Partners:** Consortium partners and project owners who have a direct stake in URBREATH's outcomes and are responsible for project planning, execution, and delivery. These stakeholders include academic institutions, research centers, and private companies involved in developing project technologies and methodologies.
- **Investors and Funding Bodies:** Public and private investors, including EU funding agencies and sustainability-focused venture capital firms, provide financial resources for the project. They are interested in URBREATH's potential for economic returns and long-term sustainability benefits.
- **Creditors:** Financial institutions that may extend credit or loans to support URBREATH's implementation and growth. They assess the financial stability of the project and its ability to generate revenue for repayment.
- **Communities and Local Residents:** The communities directly impacted by URBREATH's solutions, particularly in cities and urban areas where the project's technologies and Nature-Based Solutions (NBS) will be implemented. Their needs and feedback are essential for ensuring project acceptance and social impact.
- **Trade Unions and Industry Organizations:** These represent workers and professionals in urban planning, construction, and environmental management, ensuring that the project's practices align with labor standards and industry norms.
- **Employees and Project Staff:** The project's internal team members, including researchers, developers, and administrative personnel, work to execute and support URBREATH's objectives. Their involvement ensures the project's day-to-day operations and long-term success.

- **Government Agencies and Policy Makers:** Local, regional, and national government bodies responsible for urban planning, environmental protection, and policy-making. Their support and regulatory compliance are crucial for adopting URBREATH’s solutions.
- **Media and Public Relations:** Media organizations and public relations professionals help communicate URBREATH’s mission, successes, and societal benefits to the public. They are key in building awareness, fostering public support, and enhancing URBREATH’s visibility.

6.2 Stakeholder Analysis

Effective stakeholder management is critical to the success of URBREATH’s objectives in sustainable urban development. This section provides a detailed analysis of the key stakeholder groups involved in or impacted by the project. Each group is described based on their role, interests, level of influence, and expected contributions. This comprehensive understanding helps ensure that stakeholder needs are addressed, collaboration is fostered, and the project’s solutions are implemented effectively and inclusively. Below is an overview of the stakeholder groups, including customers, suppliers, project partners, investors, local communities, government agencies, and more, along with their specific interests and potential contributions to the success of URBREATH.

- **Customers**
 - **Description:** Municipalities, urban planners, environmental agencies, and private development firms.
 - **Interests:** Sustainable urban planning solutions, climate resilience tools, and environmental policy compliance.
 - **Influence:** High; these stakeholders are directly involved in implementing and evaluating URBREATH’s solutions.
 - **Expected Contribution:** Feedback on tool effectiveness, participation in pilot projects, and collaboration in scaling successful solutions.
- **Suppliers and Technology Providers**
 - **Description:** Software vendors, digital infrastructure providers, IoT device suppliers.
 - **Interests:** Providing high-quality technology to support URBREATH’s advanced digital twin, AI, and environmental modeling needs.
 - **Influence:** Moderate; they enable project implementation by providing necessary technological resources.
 - **Expected Contribution:** Supply of reliable and innovative technology solutions, technical support, and potential partnership opportunities for further product development.
- **Owners and Project Partners**
 - **Description:** Academic institutions, research organizations, and private companies within the URBREATH consortium.
 - **Interests:** Successful project outcomes, knowledge generation, scientific recognition, and future funding opportunities.
 - **Influence:** High; responsible for project strategy, execution, and decision-making.

- **Expected Contribution:** Research and development expertise, technical resources, leadership in execution, and ongoing project evaluation.
- **Investors and Funding Bodies**
 - **Description:** European Union (EU) funding agencies, venture capitalists, and sustainability-oriented investors.
 - **Interests:** Financial returns, project sustainability, and social/environmental impact.
 - **Influence:** High funding is essential for project advancement and scalability.
 - **Expected Contribution:** Financial support, strategic guidance, and networking opportunities to expand URBREATH's reach.
- **Creditors**
 - **Description:** Banks and financial institutions that may provide loans or financial support.
 - **Interests:** Economic viability and stability of the project, repayment of loans.
 - **Influence:** Moderate; while they are not directly involved in project activities, financial stability influences project operations.
 - **Expected Contribution:** Provision of capital, financial structuring, and risk assessment.
- **Communities and Local Residents**
 - **Description:** People living in areas where URBREATH's solutions will be implemented, including urban neighborhoods and local community groups.
 - **Interests:** Improved quality of life, environmental benefits, and transparency in urban development projects.
 - **Influence:** High community acceptance is vital for the success and legitimacy of URBREATH's solutions.
 - **Expected Contribution:** Feedback on project impact, participation in public consultations, and advocacy for sustainable urban solutions.
- **Trade Unions and Industry Organizations**
 - **Description:** Unions and associations representing professionals in urban planning, environmental sciences, and related fields.
 - **Interests:** Fair labor practices, professional development, and adherence to industry standards.
 - **Influence:** Low to moderate; while they may not directly impact project execution, their support enhances credibility within the industry.
 - **Expected Contribution:** Guidance on labor standards, industry best practices, and networking within relevant professional communities.
- **Employees and Project Staff**
 - **Description:** Researchers, developers, administrative staff, and management within the URBREATH project.
 - **Interests:** Job satisfaction, career development, project success, and research advancement.
 - **Influence:** High; these stakeholders are integral to day-to-day operations and the development of project solutions.

- **Expected Contribution:** Research, technical expertise, operational support, and internal knowledge sharing to drive project outcomes.
- **Government Agencies and Policy Makers**
 - **Description:** Municipal, regional, and national government bodies responsible for urban policy, environmental regulations, and public health.
 - **Interests:** Sustainable urban growth, policy alignment, and achievement of climate goals.
 - **Influence:** High regulatory compliance and policy support are crucial for project approval and implementation.
 - **Expected Contribution:** Policy guidance, regulatory approvals, public funding, and facilitation of cross-sector collaborations.
- **Media and Public Relations**
 - **Description:** News outlets, social media platforms, PR agencies, and communications specialists.
 - **Interests:** Publicizing project success, promoting sustainable urban development, and engaging audiences in climate resilience topics.
 - **Influence:** Moderate to high; media coverage enhances project visibility and public support.
 - **Expected Contribution:** Coverage of project milestones, public engagement through media channels, and support in building URBREATH's brand as an innovative leader in urban sustainability.

7 Individual exploitation plans

The URBREATH project brings together a diverse consortium of 36 partners from various sectors, including academic institutions, research organizations, technology providers, governmental agencies, consulting firms, and environmental advocacy groups. Each partner uniquely accomplishes the project's objectives, contributing specialized expertise and resources to drive urban sustainability and climate resilience initiatives.

This section outlines each partner's roles and potential contributions, highlighting how they can leverage the project outcomes to advance their individual and collective goals. By identifying and analyzing each partner's specific capabilities and strategic interests, URBREATH ensures a well-rounded exploitation strategy that maximizes the impact of its innovative solutions across European cities and beyond. This approach facilitates a collaborative framework where each partner's strengths are aligned with the project's vision, fostering long-term sustainability and scalability of the URBREATH outcomes.

Coordinator

- **The Lisbon Council for Economic Competitiveness ASBL (LC):** Coordinates the project, ensuring synergy among partners. Exploitation includes developing policy recommendations based on URBREATH's findings, advocating for urban sustainability in EU policy circles, and disseminating project results to governance and economic development stakeholders.

Academic and Research Institutions

- **Politecnico di Milano (POLIMI)** and **Universidad Politecnica de Madrid (UPM):** These institutions contribute expertise in urban planning and engineering. POLIMI and UPM can integrate project findings into academic research, educational programs, and regional partnerships for urban sustainability.
- **Fraunhofer Gesellschaft (FRAUNHOFER)** and **University of Stuttgart (USTUTT):** Lead applied research in digital twins and environmental modeling. FRAUNHOFER and USTUTT can commercialize digital twin technologies and environmental assessment tools.
- **Tallinna Tehnikaülikool (TAL):** Provides expertise in environmental science. TAL can further research initiatives in climate resilience and collaborate with Estonian municipalities to deploy URBREATH.
- **Vlaamse Instelling voor Technologisch Onderzoek N.V. (VITO):** Specializes in environmental technology. VITO can commercialize climate impact assessment models and offer consultancy on Nature-Based Solutions (NBS).
- **Kajaanin Ammattikorkeakoulu Oy (KAMK):** Focuses on digital interfaces. KAMK can create user-friendly digital solutions tailored for Finnish municipalities.
- **Institute of Communication and Computer Systems (ICCS):** Develops ICT tools for stakeholder engagement and can offer consulting services and technical expertise in these platforms.

Government and Municipal Partners

- **Vlaamse Gewest (VLO), Ayuntamiento de Madrid (MAD), Stad Leuven (LEU), Tallinna Linn (TLN), Municipiul Cluj-Napoca (CLUJ), Comune di Parma (PA), Aarhus Kommune (AA), Sprava Informacnich Technologii Mesta Plzne (PI), Kajaanin Kaupunki (KA):** These municipalities and regions provide real-world environments for piloting URBREATH's solutions. Exploitation involves integrating project findings into local urban planning policies, climate adaptation strategies, and public infrastructure improvements.

Technology Providers

- **Engineering—Ingegneria Informatica SPA (ENG):** ENG focuses on digital twins and smart city solutions. It can commercialize digital twin solutions for urban management applications.
- **DedA NEXT SRL (DEDA)** specializes in data analytics. DEDA can offer urban planners and environmental agencies data analysis tools from URBREATH.
- **Athens Technology Center (ATC):** Provides IT solutions for stakeholder engagement. ATC can offer licenses for these tools to municipalities and consulting services to promote public participation in urban planning.
- **virtualcitySYSTEMS GmbH (VCS):** Develops spatial data solutions. VCS can offer URBREATH's digital mapping and urban planning tools as commercial products.
- **Telesto Technologies (TEL) and Exus Software (EXUS):** Develop ICT solutions. TEL and EXUS can adapt URBREATH's technological components for innovative city applications and data-driven urban management.

Consulting and Strategic Planning Firms

- **Diadikasia Business Consulting (DBC):** Provides strategic urban planning consulting. DBC can apply URBREATH's outcomes to offer specialized urban planning consultancy services.
- **Latitudo 40 SRL (LAT) and Urbansofia SRL (URB):** Focus on urban and strategic planning. LAT and URB can integrate URBREATH's tools into consulting services for urban development, particularly in Southern Europe.
- **Municipia SPA (MUN):** Develops solutions for public administration. MUN can apply URBREATH's models to offer public sector consulting services.
- **Traza Territorio, S.L.L. (TRA):** Specializes in territorial planning. TRA can use project findings to improve urban planning practices within Spain.
- **Dark Matter Laboratories BV (DML):** Specializes in urban innovation labs. DML can use URBREATH's solutions to support new urban policy and planning methodologies.

Public Policy and Community Organizations

- **Climate Alliance (CA):** CA engages in climate action advocacy. CA can leverage URBREATH's findings to influence climate policies across its network and support advocacy for sustainable urban solutions.
- **Foreningen BLOXHUB (BLOX):** Promotes sustainable urban development. BLOX can use URBREATH's outputs to foster cross-sector collaborations in sustainable cities and increase awareness of NBS.

- **Open & Agile Smart Cities (OASC):** OASC supports adopting smart city solutions. It can disseminate URBREATH's tools and insights to its member cities globally, encouraging a more comprehensive application of smart city solutions.

Environmental and Climate Organizations

- **Fundacion para la Investigacion del Clima (FIC):** Researches climate impact. FIC can further develop climate impact methodologies and contribute to scientific publications on urban resilience.
- **Basurama Asociacion (BAS):** This organization focuses on environmental awareness. BAS can use URBREATH's NBS models to support community outreach and public education on sustainable urbanization.

Specialized Urban Stakeholders

- **Anaplassis Athina (AT):** AT is an urban revitalization specialist. AT can use URBREATH's urban regeneration findings for Athens-based projects.
- **Kajaanin Kaupunki (KA)** is the local government for Kajaani, Finland. KA can implement project outcomes to enhance local urban planning and climate resilience strategies.

8 Conclusions

The URBREATH project is a comprehensive and forward-thinking initiative that addresses the urgent need for sustainable urban development and climate resilience in cities. Recognizing the significant pressures climate change and urbanization impose on city infrastructure, ecosystems, and communities, URBREATH integrates cutting-edge technologies and methodologies to provide a well-rounded approach to urban resilience. The project's suite of Exploitable Results (ERs) is designed to meet diverse challenges, from enhancing stakeholder engagement and participatory planning to developing advanced data analytics and predictive models for climate adaptation.

Each ER in the URBREATH project has been strategically crafted with clear paths to commercialization and adoption across multiple sectors. The project's offerings range from ICT tools and community engagement platforms to predictive AI models and dynamic digital twins, allowing real-time monitoring and scenario planning. Together, these tools position URBREATH at the forefront of urban climate resilience, offering cities and communities a set of adaptable, scalable solutions for addressing environmental, social, and economic vulnerabilities. By creating these ERs, URBREATH supports cities in managing both immediate climate risks and the longer-term goals of sustainable, livable urban spaces.

One of the most notable strengths of URBREATH is its alignment with global environmental and climate goals, particularly those laid out by the European Green Deal and the United Nations Sustainable Development Goals (SDGs). This alignment increases the project's relevance and makes it a valuable asset to policymakers and urban planners working within regulatory frameworks prioritizing climate adaptation, emissions reduction, and sustainable development. By addressing these critical policy goals, URBREATH can appeal to stakeholders, from local governments and environmental agencies to NGOs, private investors, and multinational institutions focused on urban resilience.

Furthermore, URBREATH's focus on participatory planning and stakeholder engagement tools emphasizes inclusivity and transparency, which are essential in modern urban planning. The ICT tools, e-participation platforms, and Communities of Practice (CoP) developed within the project empower residents, policymakers, and experts to collaborate, share knowledge, and make informed decisions that reflect the needs and values of the community. This participatory approach fosters trust and enhances public buy-in, increasing the likelihood of successful, long-term adoption of climate resilience initiatives. The project's dedication to community engagement strengthens its social impact and provides a model for other urban projects seeking to involve stakeholders in meaningful ways.

From a market perspective, URBREATH's diverse ERs allow it to target multiple sectors within urban resilience, including public health, urban infrastructure, environmental monitoring, and emergency management. For example, the AI models for flood risk assessment, quality of life predictions, and climate impact assessment datasets offer high-value solutions to the public and private sectors. URBREATH enables cities to anticipate and respond to environmental challenges, such as flooding or extreme weather events, by developing adaptable, high-resolution predictive tools with greater accuracy. This proactive approach helps reduce the economic and social costs associated with climate-

related disasters, offering an attractive proposition for municipalities, insurance companies, infrastructure planners, and emergency response agencies.

Moreover, the URBREATH project's strong focus on continuous innovation ensures that its solutions remain adaptable to the rapidly evolving needs of urban environments. Urban sustainability and resilience require solutions that can grow alongside technological advancements, policy, and societal expectations. URBREATH's iterative development strategy and ongoing collaboration with industry experts, policymakers, and technology providers lay a foundation for sustained impact and relevance. By investing in regular updates, expanding features, and exploring cross-sector applications, URBREATH can maintain its competitive edge, providing urban stakeholders with the reliable and cutting-edge tools needed to navigate complex climate challenges.

The next stages of Exploitation Planning initially involve a more detailed identification and prioritization of the Key Exploitable Results (KERS) and the Individual Exploitation Plans. Subsequently, distinct Business Models will be developed for each KER, which will later form the foundation for defining the project's Business Cases.

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