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D1.1.1
Report on Open Data & IoT usage good practices for territorial governance at city-region level

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A. Introduction

Deliverable 1.1.1 is the starting point of the strategy of Project EnCLOD for advancement of Open Data use to support territorial government, through the means of a comprehensive survey of existing Good practices on the international level. The objective of this Deliverable is to provide a series of benchmarking elements for the future development of Open Data usage in the five project Pilot Areas, located throughout the Central Europe territory.

To collect the Good Practices and analyse them an online questionnaire has been devised and submitted to the whole partnership by the activity coordinator (P08, University of Ljubljana), in order to gather examples of the use of Open data to support the public authorities in their countries, in Europe and beyond. The results represent the basis for the upcoming activities of the project, providing an example and inspiration for the elaboration of the Preliminary Guidelines (Activity 1.3), of the Local Action Plans (Activiti 1.4) and of the whole project action.

During the activities to prepare Deliverable 1.1.1, the partners collected and analyzed methodologies, guidelines, and concrete examples of the use of Open Data (OD) and IoT sensor networks for city-region planning and territorial governance, with particular focus on the topics addressed by the EnCLOD project (urban and peri-urban mobility, road management, and climate change adaptation).

Starting with official publicly available documents, such as the Open Data Maturity Reports from data.europa.eu and ESPON program results, as well as a literature review, partners gathered and analyzed approaches and good practices in both the EU and globally. The aim was to explore data-driven territorial governance and effective methods for civil society engagement and trust building through data. A total of 61 Good practices were examined.

Common criteria and a format for identifying and describing good practices were established at the beginning of the activity and applied by all involved partners. The resulting materials were made publicly available to project partners and wider audiences through the project website. These findings formed the basis for the development of subsequent solutions, as well as for education and skills development.

Background of Deliverable 1.1.1: The Role of IoT in the European ICT Rolling Plan 2025 and Beyond

The EU ICT Rolling Plan 2025 highlights the Internet of Things (IoT) as a key area within the digital single market. The IoT connects a wide range of devices, from industrial machines to household equipment, creating a vast network of over 20 billion devices, expected to grow to 50 billion by 2030. This expansion will generate 79.4 zettabytes (ZB) of data, influencing various sectors through cyber-physical systems. One of the key actions includes developing standards that ensure compliance and enable integration of AI, data processing, and digital twins into IoT systems, covering security, privacy, and metadata concerns. (See EU Rolling Plan for ICT standardisation.)

In the global market, LoRaWAN, a major IoT segment, is growing rapidly, projected to reach US$5.7 billion in 2024 with a 9.5% annual growth rate until 2030. Despite the competition forcing companies like Cisco to exit the market, IoT remains a catalyst for innovation, particularly in urban environments. The EnCLOD project has identified challenges related to open IoT data quality and accessibility, emphasizing the importance of public sector IoT data for improving governance and public services. The success of Europe's IoT competitiveness depends on the sustainable and trustworthy provision of open IoT data by cities. (See LoRaWAN IoT Market Outlook from 2024 to 2034.)

Abbreviations

OD – Open Data

IoT – Internet of Things

PROVI - Province of Vicenza

MONG - Urban Municipality of Nova Gorica

NGO – Non-Governmental Organization

UHI – Urban Heat Island

API – Application Programming Interfaces

ESPON - European Observation Network for Territorial Development and Cohesion

DOI - Digital Object Identifier

B. Methodology for the Deliverable

A questionnaire was developed, consisting of 20 short and long-form questions aimed at gathering detailed insights into the use of OD and IoT sensor networks. Project partners were asked to provide their responses by filling out the questionnaire using Google Forms.

This approach ensured a standardized and efficient method for collecting data across all participating partners.

To prevent duplication of responses, all submitted data were made available to the partners in a shared spreadsheet. This allowed them to freely review and build upon each other's answers. No restrictions were imposed on word count, encouraging partners to provide as much detail as necessary in their responses. This open and collaborative approach fostered a thorough exchange of ideas and information.

Questionaire form - References collection for Open Data

Done on the Google Drive Platform – Google Forms

Link:https://docs.google.com/forms/d/e/1FAIpQLSccAy14webC2u10-2I8Yxs1mPQ99WSqm8o7L-ISB4mF64vfYQ/viewform

Objective:

The aim of this activity was to identify and analyze successful Open Data and Internet of Things sensor network implementations from the EU and globally. The goal was to gather best practices and explore how these solutions can be adapted to meet the project partners' needs.

Focus Areas:

The benchmarking focused on a few key themes:

- Urban and Peri-urban mobility
- Road management
- Climate change adaptation

The main objective was to improve understanding among project partners about how OD and IoT sensor networks can be applied to city-region planning and territorial governance, informing the development of innovative solutions in these areas. **We required a minimum of 40 answers, we received 61.**

The questionnaire

The questionnaire was devided into 2 parts, the first part containing 6 partner specific questions, and the second part containing 14 questions regarding the specific example given as a best practice.

We asked for feedback from all partners, even if they were not required to submit information

PARTNER SPECIFIC QUESTIONS:

Partner affiliation

01 Each partner selected their affiliation to ensure clarity in tracking contributions. Although PROVI, MONG, and CITIQ were not required to participate, they were encouraged to share their insights if they wished to contribute to the project.

Have you previously worked with Open Data or IoT sensor networks?

02 Partners had to describe their prior experience with Open Data or IoT sensor networks. This question aimed to assess the familiarity and expertise of each partner, helping to identify any gaps in knowledge or areas where additional support might be needed. It also provided insight into the depth of practical experience across the partnership, contributing to the benchmarking process.

Which of the following topics are you most interested in? (Select all that apply)

03 Partners were invited to select the topics that align most closely with their interests and expertise. This question helped to identify key focus areas within the project, allowing for a more targeted approach when reviewing and analyzing case studies. The diverse range of topics, from urban mobility and climate change adaptation to civil society engagement and green energy management, ensured that various aspects of data-driven territorial governance were covered, in addition, an "Other" option allowed for additional areas of interest to be highlighted.

Which official documents or sources are you most likely to refer to for information on Open Data and IoT sensor networks? (Select all that apply)

04 Partners were asked to indicate which official documents or sources they commonly consult for information on OD and IoT sensor networks. Options included key publications like the Open Data Maturity Reports, ESPON programme results, and reports from institutions such as Eurostat, the European Environment Agency (EEA), the European Commission, and international organizations like the OECD, World Bank, and United Nations. The inclusion of "Scientific literature" and "Other" allowed partners to highlight any additional relevant sources they use, helping to understand the breadth of their research and reference materials.

Please suggest any additional repositories or open data source sites that should be considered for this benchmarking activity:

05 Partners were encouraged to propose additional repositories or open data source websites that could contribute valuable information to the benchmarking activity. This question allowed the project to expand its pool of resources beyond the pre-identified sources, ensuring that all relevant and potentially beneficial data sources were considered. By gathering suggestions from partners, the

project aimed to incorporate diverse perspectives and ensure comprehensive coverage of Open Data and IoT sensor network implementations.

In your opinion, what are the key criteria for identifying good practices in data-driven territorial governance?

06 Partners shared their views on the essential criteria for identifying effective practices in data-driven territorial governance. This question aimed to elicit a range of insights, focusing on factors such as scalability, sustainability, stakeholder engagement, data quality, and the impact of implemented solutions. By compiling these criteria, the project sought to establish a robust framework for evaluating and selecting good practices, ensuring that the identified examples would contribute meaningfully to the goals of the EnCLOD project.

Best practice / case study questions:

*This part of the activity was completed by all partners except PROVI, MONG, and CITIQ.

What is the name or title of the best practice/case study reference?

07 Partners were prompted to provide the name or title of the best practice or case study they wished to reference. This question aimed to facilitate the identification and categorization of specific examples that exemplified successful implementations of Open Data and IoT sensor networks. By collecting this information, the project could create a comprehensive database of relevant case studies that could be further explored and analyzed in relation to the themes of the EnCLOD project.

What kind of best practices/case study reference type are you suggesting? (Select all that apply)

08 Partners were asked to specify the type of reference for the best practice or case study they were suggesting. Options included categories such as best practices, studies, pilot programs, projects, and journal articles, along with an "Other" option for any additional types not listed. This question aimed to categorize the submissions effectively, allowing for a clearer understanding of the sources and formats of the practices identified. By capturing this information, the project could better assess the diversity and applicability of the suggested references in relation to data-driven territorial governance.

Which typology of data does the best practice / case study deals with? (Select all that apply)

09 Partners were invited to identify the specific typology of data addressed by the best practice or case study they were suggesting. Options included categories such as Environment, Water, Energy, Waste, and Traffic, along with an "Other" option for any additional data types not specified. This question aimed to categorize the focus areas of the practices, facilitating a better understanding of the range of data applications in the context of Open Data and IoT sensor networks. By collecting this information, the project could highlight key trends and areas of concentration within the selected case studies.

Please add a weblink or a DOI (Digital Object Identifier) for the best practice / Case study reference.

10 Partners had to provide a weblink or DOI for the suggested best practice or case study. This question aimed to facilitate access to the original source, ensuring that all partners could easily review the referenced material. By collecting this information, the project sought to create a well-documented repository of case studies that could be referenced in future analyses and discussions, enhancing transparency and credibility in the benchmarking process.

Please provide a brief description or abstract of the proposed best practice/case study reference.

11 Partners were requested to offer a concise description or abstract of the best practice or case study they were suggesting. This question aimed to capture key details about the implementation, objectives, methodologies, and outcomes of the case being referenced. By collecting these descriptions, the project could create a comprehensive overview of each example, facilitating a deeper understanding of its relevance and effectiveness in the context of Open Data and IoT sensor networks for territorial governance.

Geographic Location of the best practice/case study reference (Europe vs. World)

12 Partners provided the geographic location of the suggested best practice or case study by selecting either Europe or World. This question aimed to categorize the references based on their geographical context, helping to understand the regional applicability of the practices identified. By gathering this information, the project could identify trends and variations in the implementation of Open Data and IoT sensor networks across different regions, facilitating comparisons and insights relevant to the EnCLOD project's objectives.

At which territorial scale was the best practice / case study applied? (City vs. Region)

13 Partners specified the territorial scale at which the suggested best practice or case study was implemented, choosing between City or Region. This question aimed to clarify the scope of each case, providing insights into whether the practices were designed for local urban settings or broader regional contexts. By collecting this information, the project could better assess the relevance and adaptability of the identified practices in relation to various scales of territorial governance and planning.

At which territorial scale was the best practice / case study applied? (City vs. Region)

14 Partners specified the territorial scale at which the suggested best practice or case study was implemented, choosing between City or Region. This question aimed to clarify the scope of each case, providing insights into whether the practices were designed for local urban settings or broader regional contexts. By collecting this information, the project could better assess the relevance and adaptability of the identified practices in relation to various scales of territorial governance and planning.

City/Region: (list multiple locations if applicable)

15 Partners were asked to specify the city or region where the best practice or case study was implemented, with the option to list multiple locations if applicable. This question aimed to provide precise geographic context for each reference, enabling a clearer understanding of the specific areas impacted by the practices. By gathering this information, the project could identify local trends and variations in the application of Open Data and IoT sensor networks, enriching the overall analysis of territorial governance solutions.

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? (Yes/No/Other)

16 Partners were prompted to indicate whether the suggested practices, methodologies, studies, pilot programs, and projects were implemented in real life by selecting Yes, No, or Other. This question aimed to assess the practical applicability and real-world relevance of the referenced examples. Understanding whether these initiatives were executed successfully would help the project evaluate the effectiveness and potential for replication of the identified practices in data-driven territorial governance.

How were the methodologies, studies, pilot programs, and projects implemented in real life? (Select all that apply)

17 Partners were invited to select the methods through which the suggested methodologies, studies, pilot programs, and projects were implemented. Options included policy changes and regulations, the introduction of new technologies and infrastructure, the development and deployment of mobile or web applications, community engagement and participatory approaches, pilot programs and small-scale trials, educational programs and workshops, and an "Other" option for any additional methods not listed. This question aimed to provide insight into the various strategies employed to implement these practices, helping to identify successful approaches that could be adapted or replicated in other contexts.

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

18 Partners described the positive outcomes or successes that resulted from the implementation of the suggested practices, methodologies, studies, pilot programs, or projects. This question aimed to capture specific benefits, such as improved data accessibility, enhanced decision-making processes, increased community engagement, or measurable environmental impacts. By documenting these successes, the project could highlight effective strategies and provide evidence of the value of OD and IoT sensor networks in achieving tangible results in territorial governance.

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

19 Partners were prompted to identify the challenges or negative outcomes that were encountered during the implementation of the suggested practices, methodologies, studies, pilot programs, or projects. This question aimed to uncover any difficulties faced, such as technical issues, resistance from stakeholders, funding limitations, or insufficient data quality. By documenting these challenges, the project could gain insights into potential obstacles to successful implementation and

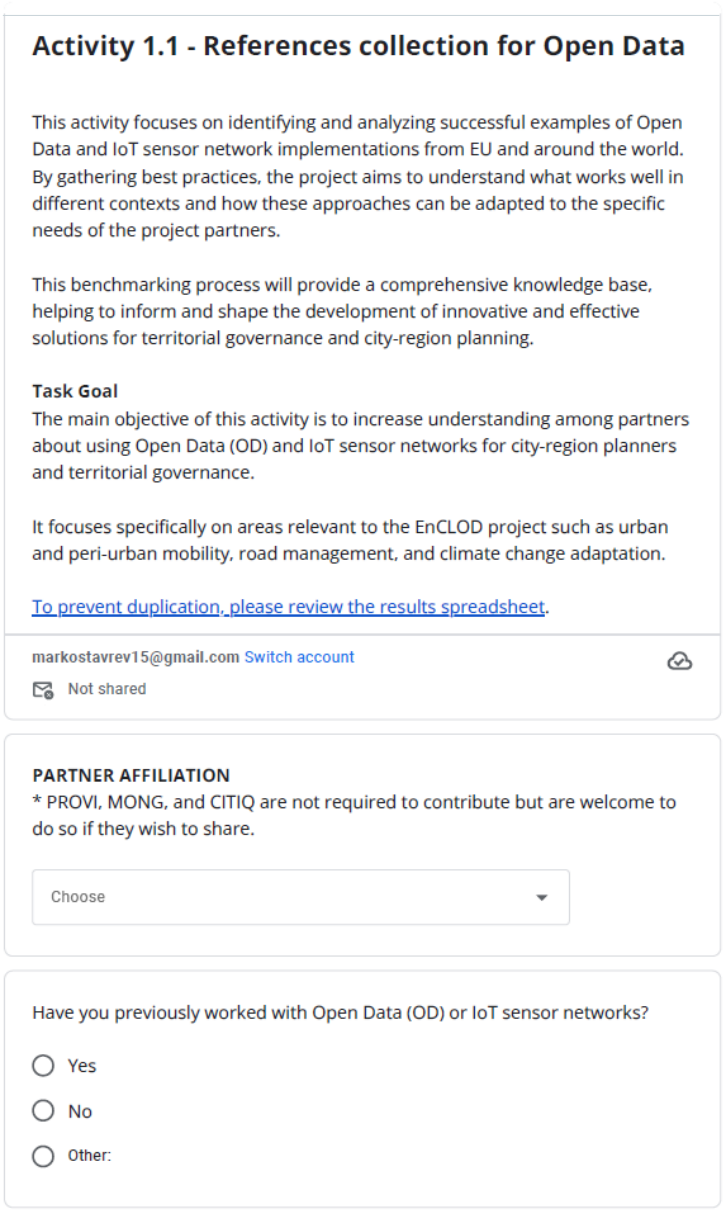
develop strategies to address them in future initiatives involving Open Data and IoT sensor networks for territorial governance.

For which pilot action do you think this reference source would be applicable? (Select all that apply)

20

Partners had to select the pilot actions where they believe the suggested reference source would be applicable. Options included specific locations such as Debrecen, Nova Gorica, Olomouc, Vicenza, and Žilina, along with the option to select "All of them" or "Other" for any additional locations or contexts not listed. This question aimed to assess the relevance of the referenced practices to various pilot actions within the project, helping to identify opportunities for implementation and adaptation of successful strategies in different settings.

The questionaire on Google Forms



Activity 1.1 - References collection for Open Data

This activity focuses on identifying and analyzing successful examples of Open Data and IoT sensor network implementations from EU and around the world. By gathering best practices, the project aims to understand what works well in different contexts and how these approaches can be adapted to the specific needs of the project partners.

This benchmarking process will provide a comprehensive knowledge base, helping to inform and shape the development of innovative and effective solutions for territorial governance and city-region planning.

Task Goal
The main objective of this activity is to increase understanding among partners about using Open Data (OD) and IoT sensor networks for city-region planners and territorial governance.

It focuses specifically on areas relevant to the EnCLOD project such as urban and peri-urban mobility, road management, and climate change adaptation.

To prevent duplication, please review the results spreadsheet.

markostavrev15@gmail.com Switch account

Not shared

PARTNER AFFILIATION
* PROVI, MONG, and CITIQ are not required to contribute but are welcome to do so if they wish to share.

Choose

Have you previously worked with Open Data (OD) or IoT sensor networks?

- ○ Yes
- ○ No
- ○ Other:

Which of the following topics are you most interested in? (Select all that apply)

- [ ] Urban and peri-urban mobility
- [ ] Road management
- [ ] Climate change adaptation
- [ ] Data-driven territorial governance
- [ ] Civil society engagement
- [ ] Trust building through data
- [ ] Green energy management
- [ ] Water management
- [ ] Waste management
- [ ] Air quality management
- [ ] Traffic safety
- [ ] Noise pollution
- [ ] Urban placemaking
- [ ] Other:

Which official documents or sources are you most likely to refer to for information on Open Data and IoT sensor networks? (Select all that apply)

- [ ] Open Data Maturity Reports from data.europa.it
- [ ] ESPON programme results
- [ ] Eurostat Publications
- [ ] European Environment Agency (EEA) Reports
- [ ] European Commission Reports
- [ ] OECD Publications
- [ ] World Bank Reports
- [ ] United Nations Publications
- [ ] Scientific literature
- [ ] Other:

Please suggest any additional repositories or open data source sites that should be considered for this benchmarking activity:

Your answer

In your opinion, what are the key criteria for identifying good practices in data-driven territorial governance?

Your answer

What is the name or title of the best practice / case study reference?

Your answer

What kind of the best practices / case study reference type are you suggesting? (Select all that apply)

- [ ] Best practices
- [ ] Studies
- [ ] Pilot programs
- [ ] Projects
- [ ] Journal articles
- [ ] Other:

Which typology of data does the best practice / case study deals with? (Select all that apply)

- [ ] Environment
- [ ] Water
- [ ] Energy
- [ ] Waste
- [ ] Traffic
- [ ] Other:

Please add a weblink or a DOI (Digital Object Identifier) for the Best practice / Case study reference.

Your answer

Please provide a brief description or abstract of the proposed best practice / case study reference.

Your answer

Geographic Location of the best practice / case study reference

- [ ] Europe
- [ ] World

At which territorial scale was the best practice / case study applied?

- [ ] City
- [ ] Region

Country: (list multiple countries if applicable)

Your answer

City/Region: (list multiple locations if applicable)

Your answer

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life?

- ○ Yes
- ○ No
- ○ Other:

How were the methodologies, studies, pilot programs, and projects implemented in real life? (Select all that apply)

- [ ] Through policy changes and regulations
- [ ] Introduction of new technologies and infrastructure
- [ ] Development and deployment of mobile or web applications
- [ ] Community engagement and participatory approaches
- [ ] Pilot programs and small-scale trials
- [ ] Educational programs and workshops
- [ ] Other:

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Your answer

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Your answer

For which pilot action do you think this reference source would be applicable? (Select all that apply)

- [ ] Debrecen
- [ ] Nova gorica
- [ ] Olomouc
- [ ] Vicenza
- [ ] Žilina
- [ ] All of them
- [ ] Other:

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C. Results and analysis

The data collected through the questionnaire was analyzed, resulting in the creation of several diagrams and pie charts to visually represent the findings. The analysis included both partner-specific questions and general inquiries to capture a comprehensive view of the responses.

Illustrations are provided below, accompanied by descriptions that highlight key insights and trends identified during the analysis. These visual aids serve to facilitate understanding of the data and underscore the varying perspectives and experiences of the partners involved in the project.

The results were compiled on October 2, 2024, with a total of 61 responses gathered, this provided a rich and diverse set of insights.

1.Partner specific questions

1.Have you previously worked with Open Data or IoT sensor networks?

When asked whether they had previously worked with Open Data or IoT sensor networks, most participants responded affirmatively, indicating that they had some experience in this area. Conversely, a smaller number of respondents indicated that they had not worked with OD or IoT sensor networks. This suggests a general familiarity among the partners with the concepts and applications of Open Data and IoT technologies.

PARTNER	ANSWER Y/N
1. University of Ljubljana	YES
2. IUAV Venice University	YES
3. CityOne	YES
4. University of Žilina	YES
5. Palacký University Olomouc	YES
6. DKV Debrecen Exclusive Public Transport Company LTD	YES
7. Urban Municipality of Nova Gorica	NO
8. Province of Vicenza	YES
9. CITIQ	NO

2.Which of the following topics are you most interested in?

Participants were asked to indicate the topics they were most interested in, and the responses reflected a diverse array of priorities among the partners.

Key Insights from Participant Responses

Common Interests:

- **Urban and peri-urban mobility** is the only topic that appears in all responses. This suggests a widespread focus on transportation systems in and around urban areas, likely driven by challenges in mobility, sustainability, and urban growth.
- **Climate change adaptation** is another prominent interest, appearing in all responses. This emphasizes the growing need for urban resilience in the face of climate change.
- **Data-driven territorial governance** is frequently mentioned, indicating an interest in leveraging data and digital tools to manage cities and regions more effectively.

Key Insights

- **Collaboration on Mobility Solutions**: The unanimous interest in urban mobility suggests potential for joint projects and sharing of best practices.
- **Collective Awareness of Climate Issues**: The emphasis on climate change adaptation indicates a shared responsibility to develop sustainable urban strategies.
- **Data-Driven Governance as a Priority**: Partners recognize the importance of data in shaping effective governance, suggesting a trend towards evidence-based decision-making.
- **Citizen Participation**: The inclusion of civil society engagement in discussions reflects a shift towards participatory governance, emphasizing the role of local communities in urban development.
- **Local Context Matters**: The diversity of interests indicates that successful strategies must consider local and regional contexts to be effective.

This analysis highlights the partners' varied interests while emphasizing key areas of consensus and opportunity for collaboration in addressing urban challenges.

3.Which official documents or sources are you most likely to refer to for information on Open Data and IoT sensor networks? (Select all that apply)

By identifying frequently used documents or databases, the project can ensure alignment with **industry standards**, tap into **cutting-edge research**, and ensure that best practices are grounded in **credible, peer-reviewed, and policy-backed resources**. Additionally, this question helps recognize **gaps in knowledge** or underutilized sources that could be introduced to further support project goals.

Key Insights

- **Standardized Reports as a Backbone**: The Open Data Maturity Reports serve as a critical resource, helping partners assess their practices against established benchmarks.
- **Trust in Established Institutions**: The reliance on documents from reputable organizations indicates a preference for evidence-based decision-making grounded in widely recognized standards.
- **Localized Knowledge is Key**: The inclusion of national and regional resources suggests that local contexts play a crucial role in shaping effective Open Data strategies.

- **Academic Foundations**: The emphasis on scientific literature underlines the importance of research in informing best practices.
- **Opportunity for Improvement**: Recognizing gaps in available resources can guide efforts to broaden the knowledge base and integrate diverse perspectives into project initiatives.
- **Legal Compliance**: Acknowledging legal frameworks is essential for aligning Open Data initiatives with broader governance structures.

This underscores the importance of diverse, credible, and relevant sources in shaping the partners' understanding of Open Data and IoT sensor networks, while also highlighting areas for potential growth and collaboration.

4.Please suggest any additional repositories or open data source sites that should be considered for this benchmarking activity:

The aim was to broaden the scope of potential data sources beyond the official and well-known repositories already listed. It invited participants to share less conventional or specialized sources that might offer unique insights or complement existing repositories.

By crowdsourcing suggestions from diverse partners, the project aimed to ensure that no valuable data source was overlooked, allowing for a more comprehensive and inclusive benchmarking process. This could lead to discovering niche repositories that address specific regional challenges or innovative applications of Open Data and IoT sensor networks.

Key Trends and Insights

- **EU-centric data sources dominate**, showing a preference for harmonized, comparable data that aligns with European standards.
- **Academic institutions** favor **scientific literature** for research-driven insights, while **public authorities** prefer **governmental reports** and **legal frameworks** for practical governance and compliance purposes.
- There is a **lack of specialized IoT data sources**, which could be an opportunity for the project to introduce new, targeted IoT repositories.
- **National and regional disparities** suggest that not all partners utilize localized open data sources, indicating potential for more localized benchmarking activities.

5.In your opinion, what are the key criteria for identifying good practices in data-driven territorial governance?

The goal was to capture the partners' perspectives on what defines a successful implementation or best practice in this field. By understanding the criteria partners value most, the project can align its benchmarking efforts with practical, relevant, and actionable standards.

Key Insights:

- **Data Quality and Availability**: Essential for effective territorial governance.
- **Stakeholder Engagement**: Critical for building trust and ensuring relevant solutions.
- **Sustainability and Practicality**: Highlighted as necessary for long-term impact.

- **Methodological Rigor**: Important for establishing reliable governance frameworks.
- **Data-Driven Norms**: Emphasized to foster a culture of informed decision-making.
- **Interdisciplinary Collaboration**: Recognized as vital for addressing complex governance challenges.

This shows the collective understanding among partners regarding the key criteria that define successful data-driven territorial governance, informing how the project can align its efforts with best practices in the field.

Short summary from all partner specific questions

Focus on Urban Mobility and Climate Change Adaptation: Urban mobility and climate change adaptation are top priorities among partners, reflecting a shared commitment to addressing transportation and environmental resilience challenges in city planning.

Emphasis on Data-Driven Decision-Making: Partners prioritize data-driven governance, recognizing the critical role of accessible, high-quality data and IoT sensor networks in improving territorial management and urban planning.

Reliance on Credible, Standardized Sources: The widespread use of **Open Data Maturity Reports**, **Eurostat**, and other authoritative sources ensures that project practices are aligned with established EU and global standards.

Importance of Stakeholder and Community Engagement: Engaging stakeholders and local communities is seen as essential for ensuring the long-term success and sustainability of data-driven urban and regional governance initiatives.

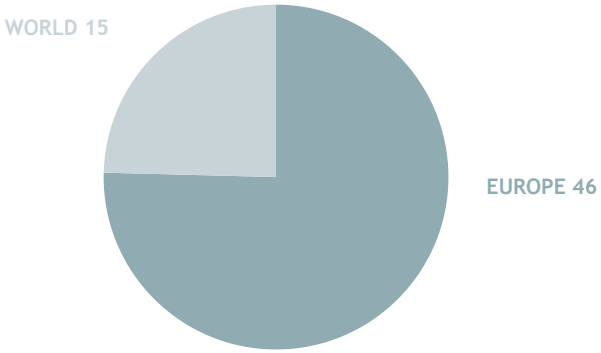
Regional and Local Contexts Are Key: Partners highlight the need for solutions tailored to local contexts, using national open data catalogues and adhering to regional laws to ensure relevance and compliance in different territories.

These insights help us understand the partners' collaborative approach to leveraging data and community engagement to drive innovative, context-sensitive solutions for urban challenges, emphasizing the importance of adaptability and shared knowledge in achieving sustainable development goals

1. Results from questionnaire

1. Geographic Location of the best practice / case study reference?

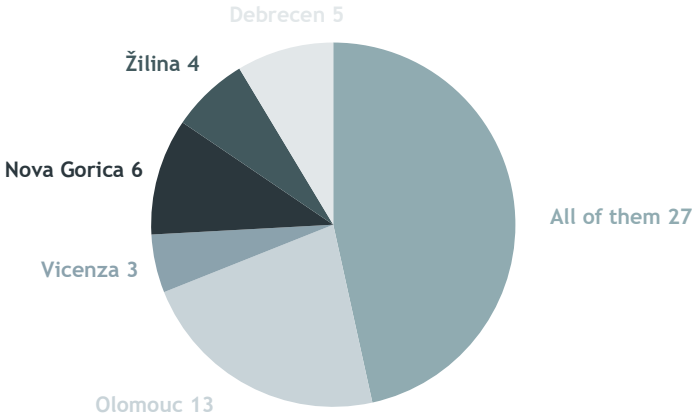
Partners provided the geographic location of the suggested best practice or case study by selecting either Europe or World.



The data indicates a strong focus on **European** case studies and best practices, reflecting the project's alignment with **European urban governance frameworks** and the availability of relevant Open Data (OD) and IoT initiatives in the region. However, the responses also show a significant interest in **global examples**, suggesting that partners are open to drawing insights from outside Europe. This highlights the importance of incorporating both **regional** and **international** best practices to ensure a **well-rounded understanding** of the global landscape for OD and IoT sensor network applications.

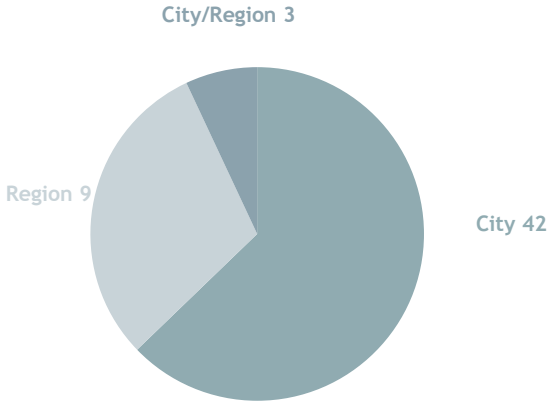
2. For which pilot action do you think this reference source would be applicable? (Select all that apply)?

A significant portion of respondents (27) believe that the reference sources are applicable to **all pilot actions**, indicating the **broad relevance** of the best practices and case studies across various cities and regions. This suggests that many of the solutions being explored are **flexible** and **scalable**, capable of addressing diverse urban and regional challenges. Additionally, **Olomouc** received the most specific mentions, signalling that it may have particular needs or priorities that align well with the gathered best practices.



The other cities, while receiving fewer individual selections, still show some tailored relevance, particularly in Nova Gorica and Debrecen.

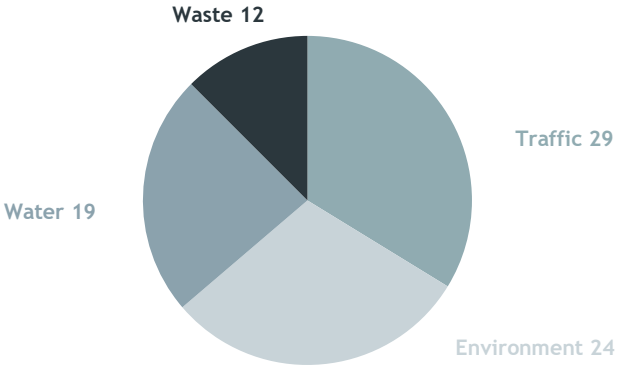
3. At which territorial scale was the best practice / case study applied?



The majority of best practices and case studies (42) were applied at the **city level**, indicating a strong focus on urban solutions and interventions. This suggests that **cities** are seen as key environments for implementing **Open Data (OD)** and **IoT networks**, likely due to the concentration of challenges like urban mobility, climate adaptation, and governance in densely populated areas. However, the combined **city-region** approach (10 responses) and regional focus (9 responses) highlight the need for solutions that also address broader, **territorial governance** issues.

This shows a growing recognition of the importance of scaling city-level initiatives to the regional context for **holistic** and **integrated** urban and regional planning.

4. Which typology of data does the best practice / case study deal with?



The most common typologies of data addressed by the best practices and case studies are **traffic** (29 responses) and **environment** (24 responses), highlighting the significant focus on **urban mobility** and **environmental sustainability**. These areas are often critical to urban governance, with traffic data playing a pivotal role in improving **mobility solutions** and environmental data being essential for **climate adaptation** efforts. **Water** and **waste** data, while slightly less represented, still show relevance, especially in the context of **resource management** and **sustainability**.

It's important to note that many projects cover multiple topics, meaning the total number of addressed areas exceeds the 61 responses, indicating a broad and overlapping approach to data utilization.

This reflects a balanced approach where multiple sectors are addressed, but traffic and environmental data remain central to most projects.

2. Summary and conclusions

General conclusion

A broad spectrum of possibilities

Examining all the best practices and case studies in urban mobility, traffic, environment, water, waste and other and participatory data collection, aimed at informing sustainable urban planning and decision-making one quickly sees multiple possibilities both for implementation and future development.

A few general notes that appear in most of the best practices / case studies are the following points:

Implementation and Methodology:

- Projects utilize Internet of Things (IoT) technology and citizen science methods for data collection, with a focus on community engagement.
- Sensors monitor traffic, pedestrian flow, environmental conditions (e.g., air quality, soil moisture), and the impact of urban heat islands.

Common Challenges:

- Technical issues such as data accuracy, sensor reliability, and gaps in data collection.
- Difficulties in maintaining long-term community participation and engagement.
- Data accessibility and ensuring high-quality, up-to-date information for decision-makers.

Positive Outcomes:

- Many initiatives have successfully integrated new technologies into urban environments, leading to improved policy decisions and urban sustainability.
- Community engagement and participatory approaches have empowered residents to contribute to data collection, fostering more informed urban planning processes.

It is important to implement more and more projects like this, valuable lessons can be learned from any level of implementation of these urban data projects, highlighting their successes. The case studies provide valuable insights into using data for improving urban environments and promoting sustainability.

To facilitate better understanding and classification, the analysis is organized by data categories. Traffic, Environment, Water, and Waste are the most prevalent categories, making them the most appropriate metrics for measurement.

Traffic

Key Insights:

1. Integration of Technology and Community Engagement:
Many projects emphasize the dual approach of leveraging advanced technology while actively involving local communities. Citizen engagement not only enhances data collection but also fosters a sense of ownership and responsibility towards local traffic issues.

2. Real-Time Data Utilization:
The successful implementation of real-time monitoring systems allows cities to respond promptly to traffic fluctuations and public needs. Real-time data is essential for optimizing urban mobility and improving service delivery in public transportation systems.

3. Interdisciplinary Collaboration:
Effective traffic management and urban planning require collaboration across various sectors, including transportation, environmental science, public health, and urban design. This interdisciplinary approach ensures a holistic understanding of the challenges and fosters innovative solutions.

4. Scalability and Adaptability:
Many projects demonstrate a framework that can be scaled and adapted to different cities or regions, making them applicable in diverse contexts. This flexibility allows cities to tailor solutions based on local needs while benefiting from shared learnings.

Positive outcomes and examples:

1.**Enhanced Traffic Management**:
Projects like the **On-Street Parking Bay (30)** system in Melbourne provide significant data on parking availability, leading to reduced congestion and improved traffic flow. This optimization translates to reduced emissions and lower fuel consumption.

2.Improved Public Policy and Planning:
Initiatives such as **WeCount (29)** and the **Array of Things (10)** have influenced local traffic policies by providing evidence-based insights. Data from citizen-led projects inform decision-making processes, resulting in policies that better reflect community needs.

3.Increased Public Awareness:
Many projects have successfully raised awareness about traffic and environmental issues within communities. Educational programs tied to data collection initiatives promote a greater understanding of the impact of individual travel choices on overall urban health.

4.Empowered Communities:
By involving residents in data collection and analysis, projects like **WeCount (29)** empower communities to take an active role in addressing local traffic issues. This empowerment can lead to long-term engagement and advocacy for sustainable urban mobility solutions.

5.Environmental Benefits:
Integration of traffic data with environmental monitoring allows cities to understand the relationship between traffic patterns and air quality. Projects focusing on air quality improvements, such as those using sensors in urban areas, have resulted in measurable reductions in pollution levels.

Challenges:

1.Technical Issues:
Many projects face challenges related to sensor reliability and data accuracy, like in **WeCount (29)**, **An integrative approach to neighborhood sustainability assessments using publicly available traffic data (37)** inconsistent data collection can undermine the effectiveness of traffic management systems, leading to misguided policies and decisions.

2.Long-Term Engagement:
Maintaining community engagement over time is a common challenge. Initial enthusiasm may wane, and sustaining participant involvement can be difficult, necessitating ongoing support and motivation strategies.

3.Data Integration Difficulties:
Projects like **An integrative approach to neighborhood sustainability assessments using publicly available traffic data (37)** and **Road Usage Insights IoT Case Study (13)** struggled with integrating diverse datasets from various sources. This lack of integration can complicate analysis and hinder effective decision-making. Ensuring interoperability among different systems is crucial for maximizing data utility.

4.Public Resistance to Change:
Implementing new technologies and altering traffic policies may face resistance from the public. Addressing concerns and educating citizens about the benefits of changes is essential for overcoming these hurdles.

Other relevant aspects:

1.Data Privacy and Ethics:
With the increased collection of personal and location data, concerns regarding privacy and ethical data use have arisen. Projects must prioritize transparency and ethical standards to maintain public trust.

2.Policy Frameworks and Support:
Strong governmental support and well-defined policy frameworks are essential for the success of traffic-related initiatives. Collaboration between local governments and organizations can facilitate the implementation of best practices.

3.Future Innovations:
The rapid evolution of technology presents opportunities for further innovation in traffic management. Emerging technologies, such as AI and machine learning, can enhance data analysis capabilities, leading to more proactive and informed urban planning.

Environment

Key Insights and examples:

1. Best **Practices from Around the World**:

Whether in Europe or global successful case studies such as the **Array of Things (10)** project in Chicago, the **London Air Quality Network (1)**, and **Barcelona's IoT network (15)**, projects focus on real-time environmental monitoring, data-driven insights for urban planning, and sustainability efforts.

2.Multisensor Networks for Comprehensive Data:

Many case studies **(Melbourne (16), Orlová (11), Telemareographic Network of the Venice Lagoon (19))** emphasize the use of multisensor networks to monitor a variety of environmental factors, such as air quality, temperature, humidity, and soil moisture.

3. Urban Heat Island Projects:

The document discusses multiple UHI-focused projects, such as those in **Prague (14) and Pardubice**, where data collection and public awareness campaigns are central to addressing heat islands in urban environments.

4. Community Engagement and Public Awareness:

Many projects, such as the **Brno (21) and Prešov geoportals (22)**, highlight the importance of involving local communities in sustainability efforts through participatory planning, data sharing, and public awareness initiatives.

5. Adoption of IoT and Technology:

Barcelona's IoT smart city initiative (15), **Venice's flood monitoring** (19) system, and the **Air Quality** trial in London demonstrate the role of **IoT technologies** in enhancing urban resilience, efficiency, and environmental monitoring.

Positive Outcomes:

1. Public **Engagement and Data Accessibility**:

Cities like **Prague (14)**, **Brno (21) and Prešov (22)** have successfully engaged the public through open data portals, improving both environmental awareness and data-driven decision-making.

2. Significant **Environmental and Financial Benefits:**

Barcelona's IoT systems (15) saved $58 million in water and $37 million annually in energy through smart lighting, alongside creating 47,000 jobs.

3. Improved Monitoring and Response Systems:

Projects like **New York's harbor water quality monitoring (17)** and the **London Air Quality Network (1)** trial show how real-time data can lead to quick responses to environmental anomalies.

4. Sustainability through Policy:

The integration of data-driven solutions with local governance, such as the UHI projects, has led to better urban planning and environmental management.

Challenges:

1. **Data Accessibility Issues**:

In some cases, like the **City of Melbourne's soil sensor project (16)**, data updates were missing, leading to a lack of real-time insights.

2. Technological and Reporting Limitations:

Projects often encountered challenges with data errors and the complexity of turning data into actionable business insights.

3.Infrastructure Delays:

Projects like the UHI zoning study in **Prague (14)** faced delays due to legislative barriers and the complexity of urban development.

4. Limited Reach of Pilot Programs:

Some successful initiatives, such as the air quality monitoring around schools in London, struggled to scale effectively or involve key stakeholders (e.g., schools).

Other Relevant Aspects:

1. Sustainability and Urban Planning:

These projects underline the importance of data-driven urban development that not only improves environmental sustainability but also enhances the quality of life for city residents.

2. Open-Source Solutions:

Geoportals like those in **Prešov (22)** and **Košice (23)** underscore the importance of open-source technologies to avoid vendor lock-in and ensure project sustainability.

3. Cross-disciplinary Collaboration:

The success of these initiatives often depends on collaboration between governments, academia, industry, and local communities.

Water

Key Insights and examples:

1.Role of Technology in Water Management
Many projects effectively integrate technology to optimize water management, including the use of **smart sensors** and **IoT networks** (15) to monitor water quality, usage, and flood risks. For example, **Barcelona's IoT water system (56)** reduced manual readings and operating costs, while projects in **Valencia (52)** and **Gandia (53)** focused on smart metering for more accurate and efficient water usage monitoring.

2.Preventive Measures and Real-Time Monitoring
Real-time monitoring plays a significant role in preventing water-related crises. **New York City's Harbor Water Quality** (17) project, for example, employs sensors to continuously monitor multiple variables such as pH, salinity, and bacterial levels, allowing authorities to respond promptly to abnormalities**. The Town of Cary** (50) has implemented flood prediction systems with IoT-based sensors, providing early warnings to prevent flood-related damage.

3.Data Accessibility and Use
Projects often aim to make water data accessible for both public and private use. Initiatives like **Cape Town's Water Map (55)** provided households with information on their water consumption, resulting in significant reductions in usage. Public access to this type of data increases awareness and encourages responsible water consumption.

4. Sustainability and Resource Efficiency
Water management projects are increasingly focused on sustainability. By integrating IoT technologies, cities are able to conserve water, reduce waste, and detect leaks early. The **SMART PUB (58)** initiative in Singapore showcases how data analytics and autonomous systems can lead to improved efficiency in water grids, reducing both operational costs and environmental impact.

Positive outcomes:

1. Improved Water Efficiency and Reduced Costs
The implementation of smart meters, like those in **Barcelona (56)**, **Valencia (52)**, and **Gandia (53)**, led to more efficient water consumption. These systems allow users to monitor their water use in real time, resulting in reduced bills and water wastage. **Barcelona's IoT system (56)** alone saved $58 million in water costs annually.

2. Reduction of Water Loss
Projects like **Gandia's smart metering system (53)** detected over 60 serious leaks per month, leading to significant water savings and infrastructure maintenance improvements. Early detection through real-time monitoring is a key factor in preventing water loss.

3. Enhanced Flood Prevention
The **flood prediction project in the Town of Cary (50)** uses data to predict and prevent flooding, improving public safety and reducing flood damage. This system has significantly enhanced the city's ability to react quickly to natural disasters, making it a model for similar projects worldwide.

4. Public Engagement and Water Conservation
Projects like **Cape Town's Water Map** (55) significantly increased public awareness of water consumption. By visualizing data for each household, the project encouraged behavioral changes that led to a 55% reduction in water use during the city's drought crisis.

Challenges:

1.Data Accessibility and Integration
Despite the vast amounts of data collected, many projects struggle with making this information accessible to the public or integrating it into broader municipal systems. For instance, **Venice's flood monitoring system (19)** provides valuable data but is not easily accessible for public use, limiting its utility outside scientific and government circles.

2. Technical Limitations and Reliability
Some projects encountered technical difficulties, such as **New York's Harbor Water Quality system (17)**, where outdated data made real-time decision-making more difficult. Similarly, **Melbourne's soil sensor network (16)** was hampered by missing updates and chaotic data management, which limited its effectiveness.

3. Cost and Resource Constraints
Implementing large-scale IoT and sensor networks can be expensive, as evidenced by **New York's energy and water performance map (57)**, which covers only specific buildings due to high costs. This poses challenges for cities with smaller budgets or less developed infrastructures.

4. Private vs Public Data Use
Many projects, such as **Barcelona's water metering (56)**, are operated by private companies and have restricted access to data. Public use of the data is limited, which reduces the potential benefits of open data initiatives in enhancing transparency and promoting wider public participation.

Other Relevant Aspects:

1. Collaboration Between Public and Private Sectors
Successful projects often involve collaboration between public institutions and private companies, as seen in **Valencia (52)** and **Gandia (53)**, where private firms helped implement smart metering systems. This partnership can improve both the implementation speed and long-term sustainability of projects.

2. **Future Potential of IoT and AI in Water Management**
The **SMART PUB (58)** initiative in Singapore highlights the future potential of integrating **AI** and **autonomous systems** into water management. By using data analytics to optimize sewer, drainage, and water grids, cities can significantly reduce resource consumption and operational costs.

3. **Regulatory Support and Policy Implementation**
Policy frameworks play a critical role in the success of these projects. Government regulations in cities like **Singapore (58)** and **Cape Town (55)** were essential in ensuring the adoption of smart water technologies and promoting public awareness. The success of these initiatives shows the importance of aligning technological advancements with supportive policies.

Waste

Key Insights and examples:

1. Smart Waste Management:

The report presents numerous examples of how cities have leveraged IoT technologies to manage waste efficiently. Notable cases include **Barcelona's IoT (15)** -based waste bins that optimize collection routes and reduce waste overflow, and **Madrid's smart paper and cardboard bins** (**59**), which helped improve waste collection schedules.

2. IoT's Role in Reducing Environmental Impact:

In projects like the **Moda re- clothing banks in Spain (46)**, IoT devices helped track the capacity of containers and optimize collection, leading to a reduction in carbon emissions and better resource management.

3. Focus on Sustainability:

Many of the highlighted projects emphasize sustainable solutions for managing waste, such as preventing sewer overflows in **Singapore (58)** through smart monitoring systems and combating illegal dumping via machine-learning-based camera systems.

4. Data-Driven Decision Making:

Case studies such as Prague's **Golemio** (21) project illustrate the importance of open data platforms in enabling cities to make informed decisions about waste management, traffic, and environmental concerns.

5. Pilot Programs for Innovation:

Pilot programs **in Madrid (59) and London** (1) demonstrate the effectiveness of small-scale IoT trials in improving waste management. These pilots often provide the opportunity to optimize and scale solutions.

Positive outcomes:

1. Optimized Waste Collection:

In **Madrid (59)**, the use of 250 smart bins reduced instances of waste overflow by 46%, leading to more efficient waste collection services. The city estimates a potential reduction of nearly 12,000 collection services per month if the system is fully implemented.

2.Reduction in Environmental Harm:

Projects like the **Moda re- clothing banks in Spain (46)** saw a 5% reduction in carbon emissions due to optimized collection practices. This shows the potential of IoT technology in reducing environmental footprints.

3. Community Engagement and Support:

In Kingston, UK, IoT-based sensors effectively reduced illegal dumping by 80%, garnering positive feedback from both local residents and council members.

4. Scalable Solutions:

Cities like **Barcelona (15) and Singapore (58)** have implemented large-scale sensor networks to monitor waste, energy, and water usage. These solutions are designed to be scalable, with long-term benefits in terms of efficiency and environmental protection.

Challenges:

1. Data Accessibility Issues

While several projects have successfully collected data, issues with accessibility and real-time updates are still common. For instance, some systems lack open data platforms, limiting the ability of external stakeholders to engage with the information.

2. Technical Failures:

In some cases, such as the Sutton trial in London, IoT-based systems faced hardware issues that hampered success. These challenges can lead to projects being deemed cost-inefficient and discontinued.

3. Cost of Scaling IoT Systems:

While pilot programs are successful on a small scale, expanding them to city-wide implementations, as seen in the case of **Madrid** (59), can be cost-intensive and logistically challenging.

4. Reliability and Maintenance:

Long-term reliability and maintenance of IoT devices is a critical concern. Technical failures and lack of repairs, such as in the Sutton case, pose risks to the effectiveness of these technologies.

Other Relevant Aspects:

1. Holistic Urban Solutions:

Projects like **Singapore's SMART PUB (58),** which integrates smart water, waste, and drainage systems, highlight the need for holistic approaches to city management. By using autonomous systems, IoT, and AI, these projects aim to enhance urban sustainability.

2. Public and Private Collaboration:

Many successful implementations, such as Barcelona's IoT systems, involve partnerships between municipalities, tech companies, and other stakeholders. This collaborative approach helps in tackling complex urban issues and ensuring sustainability.

3. Trial and Error in Pilot Programs:

The Sutton trial demonstrates that pilot programs offer valuable learning experiences but may not always succeed. These programs help refine the technology and allow cities to assess cost-benefit ratios before full-scale implementation.

D. Outstanding examples

Case study - Environment (Platform): *IPR Praha*

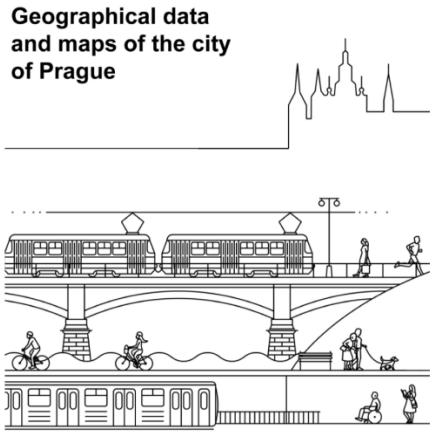
The Prague Institute of Planning and Development (IPR Prague) is Prague's main policy-making unit for architecture, planning, development, design, and administration.

The Prague Institute of Planning and Development develops and manages Prague's geographical data and performs spatial analyses of traffic accessibility, ownership relations within the city, and the structure of built-up areas, among others.

IPR Praha has a clear graphical identity, offers precise and publicly accessible information, and showcases various data in both 2D and 3D formats, making all content readable and easy to navigate.

It serves multiple functions all in one place:

1. Geoportal of Prague - https://iprpraha.cz/en/



APP

Geoportal of Prague

The Geoportal is a publicly accessible, online source of maps and information about Prague. The website offers more than thirty on-line maps of Prague – aerial photographs from different years, a noise map, and a map of the most photographed places.

OPEN THE APP!

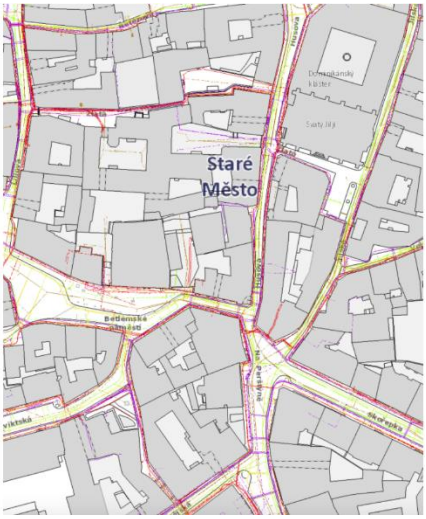
2. Digital map

APP

Digital Map of Public Administration of Prague

One of IPR Prague's key activities is managing the **basic geographical data for all urban governance activities**. The Digital Map of Public Administration of Prague includes the Technical Map, orthophoto maps, 3D models of Prague and a basic map of Prague at a scale of 1 : 25 000.

OPEN THE APP!



3. Open data

Open Data

IPR Prague provides access to data for equal and transparent sharing of spatial information. For this purpose, it is preparing the eVýdej service – a free-of-charge, electronic service for issuing spatial data and a system for direct access to open geographical data.

READ MORE!

4. Spatial analytical documentation

Spatial Analytical Documentation

Over the last several years, all spatial analytical documentation serving as the basis for planning documentation has been updated – these documents describe the important values of the capital, as well as the limits, problems and development possibilities. The current version is the most detailed survey in existence of the state of the territory of Prague.

OPEN THE APP!

5. 3D model application

APP

3D model application

Unlike Googlemaps and other programs, the 3D model application of Prague provides a wide range of detailed information about every building: for instance, it can tell you how many floors a building has and who owns it. The 3D model includes data on more than 200,000 buildings throughout the city.

The extent of the buildings and the technologies used make this a unique application for displaying the 3D city model of the city. The application is based on ESRI technology; in June 2017, IPR Prague won a "Special Achievement in GIS 2017" award from ESRI, the world's largest supplier of spatial data software. Making the city's 3D model available to both experts and the general public is one of the outcomes of IPR Prague's long-term monitoring of trends in the management and presentation of 3D models of cities.

OPEN THE APP!

IPR Praha offers a comprehensive range of tools and information aimed at urban planning and development - more cities should take this as an example for an excellent approach.

Case study - Traffic: *Traffic data analysis of the city of Zurich*

The website from the City of Zurich's open government data (OGD) portal offers various applications that leverage IoT (Internet of Things) technologies for urban management, particularly in traffic monitoring (31).

Key Features

1.Focus on Vehicle Counting:

- Zurich has developed an IoT-based network that specializes in counting vehicles across various locations in the city. The data collection effort is aimed at gaining insights into traffic volumes and patterns.

2.Established in 2012:

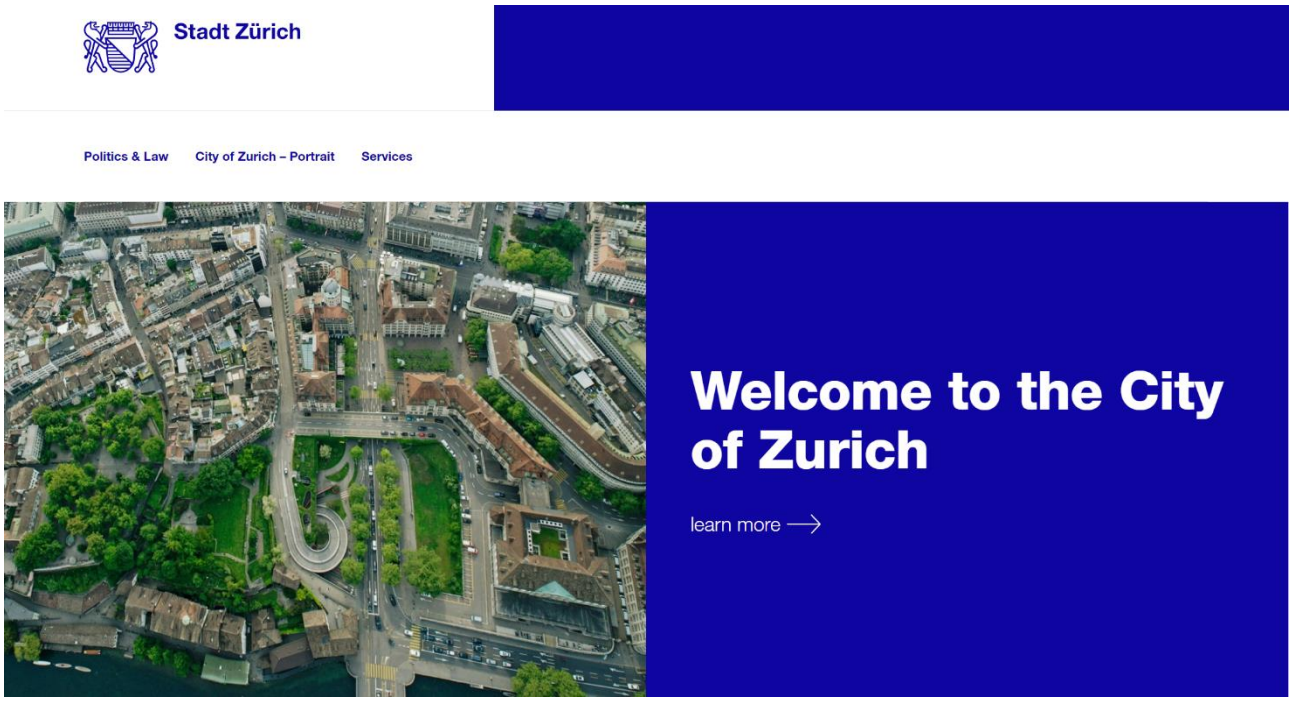
- The vehicle counting system has been operational since 2012, giving it over a decade of data to draw from, which allows for comprehensive trend analysis and year-over-year comparisons.

3.Wide Coverage - 215 Counting Locations:

- The system is extensive, with 215 counting locations strategically placed throughout the city. This provides a thorough representation of traffic patterns in different parts of Zurich.

4.Trend and Comparative Analysis:

- The data collected is used to identify trends over time, enabling a comparative analysis of traffic patterns across different years. This provides valuable insights into the evolution of traffic volumes and the impact of policy or infrastructural changes on vehicle flow.



Use Cases and Impact:

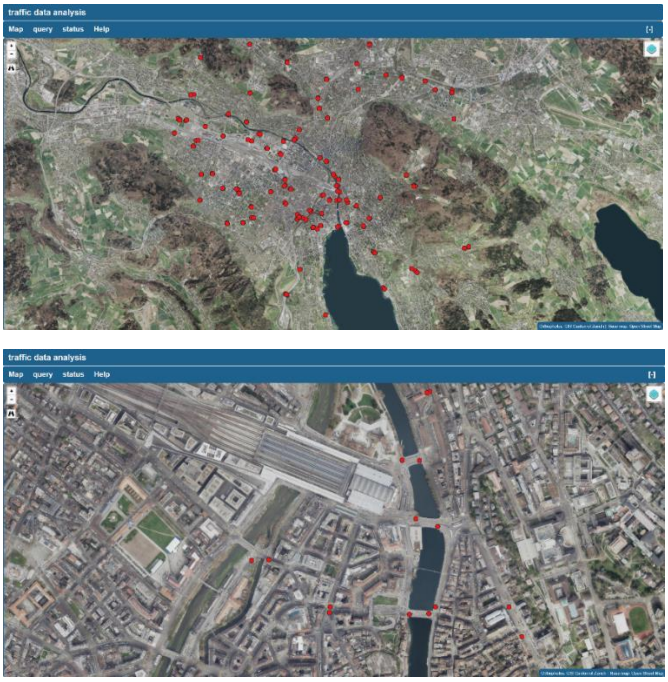
- **Urban Planning:** This IoT-driven traffic monitoring system supports Zurich's urban planning and development initiatives by providing real-time data that can be used to optimize traffic flow, improve road safety, and manage congestion.
- **Sustainability Efforts:** By analyzing vehicle volumes and traffic trends, the city can implement targeted measures to reduce carbon emissions and promote sustainable mobility solutions.
- **Decision Support:** The historical and real-time data serves as a valuable resource for decision-makers to assess the effectiveness of transportation policies and infrastructure projects.

Best Practices Observed:

- **Data Transparency and Accessibility:** this traffic data is openly available on its OGD portal
- **Scalability:** With 215 counting locations and frequent data collection, the system demonstrates scalability, showing how a comprehensive network can provide valuable insights.
- **Historical Comparison for Better Planning:** Using year-over-year traffic data comparisons helps inform long-term planning and strategic interventions in the city's transportation systems.

Possible Improvements or Future Expansion:

- **Integration with Other Data Sources:** Integrating the vehicle counting system with other IoT networks, such as public transport usage or air quality monitoring, could provide a more holistic view of urban mobility.
- **Real-time Public Dashboard:** Developing a real-time public dashboard showing live traffic data and trends could further improve citizen engagement and urban mobility.

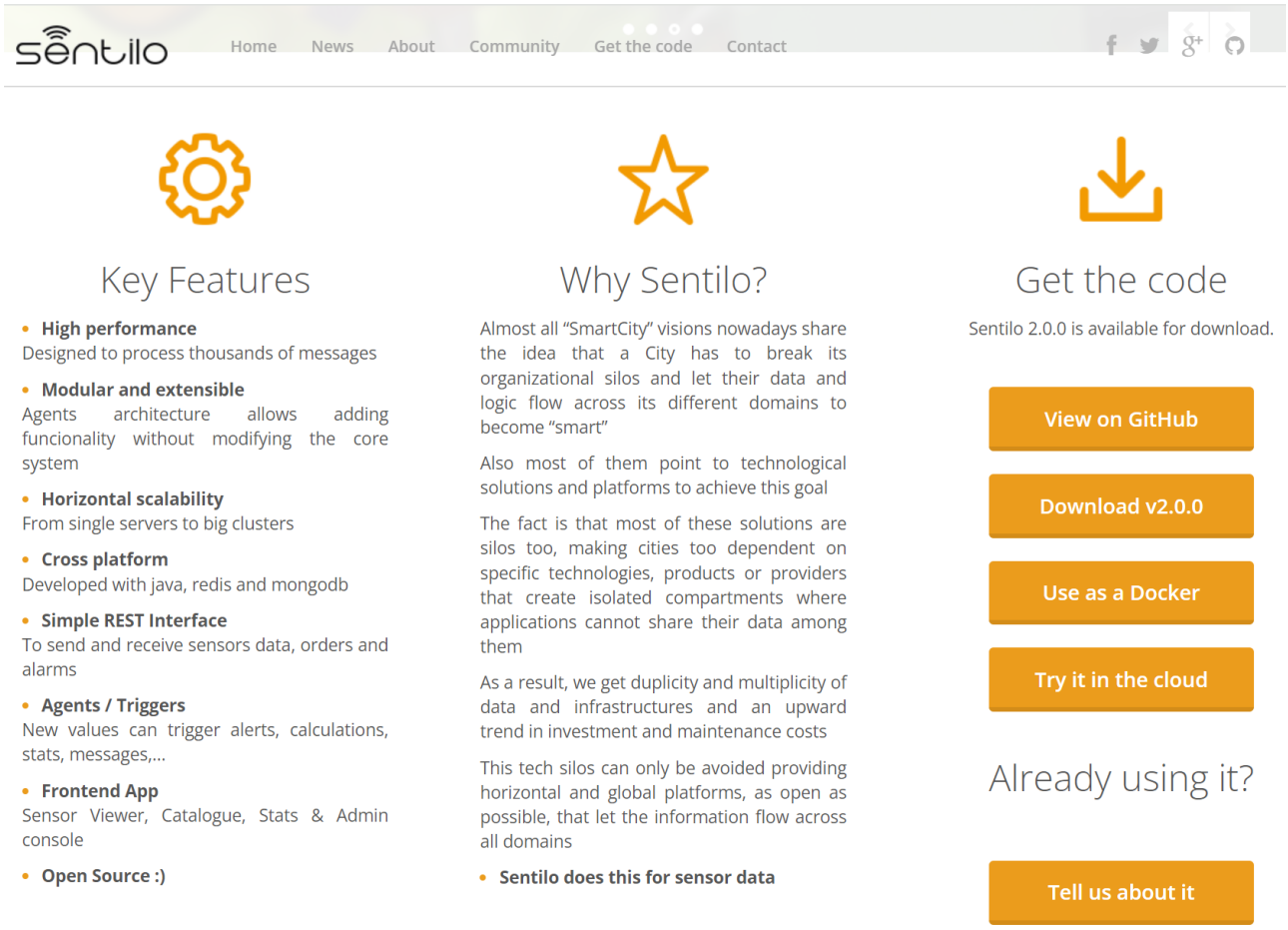


Zurich's implementation of IoT for traffic management is a solid example of how smart city technology can be effectively utilized for urban planning, sustainability, and data-driven decision-making.

Case study - Platform: *Sentilo*

Sentilo is an open-source platform designed to connect sensors with applications, facilitating urban service management.

Sentilo (27) stands out as a powerful, flexible, and scalable platform for smart city management. Its open-source foundation and interoperability make it a compelling option for municipalities looking to improve urban services through IoT integration. By offering a full suite of services, from data processing to visualization, Sentilo presents a comprehensive solution for cities aiming to become smarter, more responsive, and more efficient.



Key points

1.**Open-Source & Collaborative**: Developed in 2012 by the Barcelona City Council and Municipal Institute of Informatics, aimed at easy accessibility for urban IoT systems.

2. Core Features:

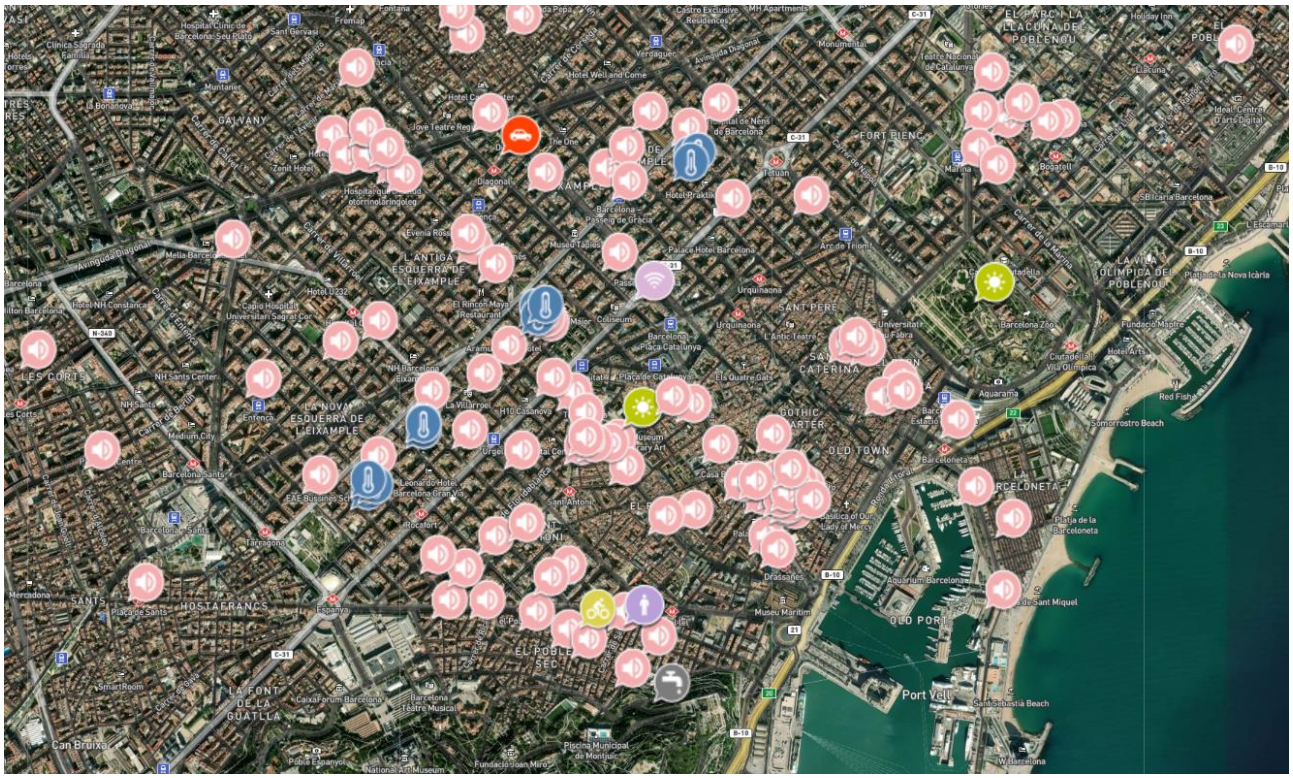
- **Message Processing Front-End**: Manages data flow between sensors and applications.
- **REST API**: Simplifies integration with other systems.
- **Administration Console**: Allows system configuration and sensor management.
- **NoSQL Database**: Ensures flexibility, scalability, and high performance.
- **Universal Viewer**: Provides a demo for building custom visualizations.

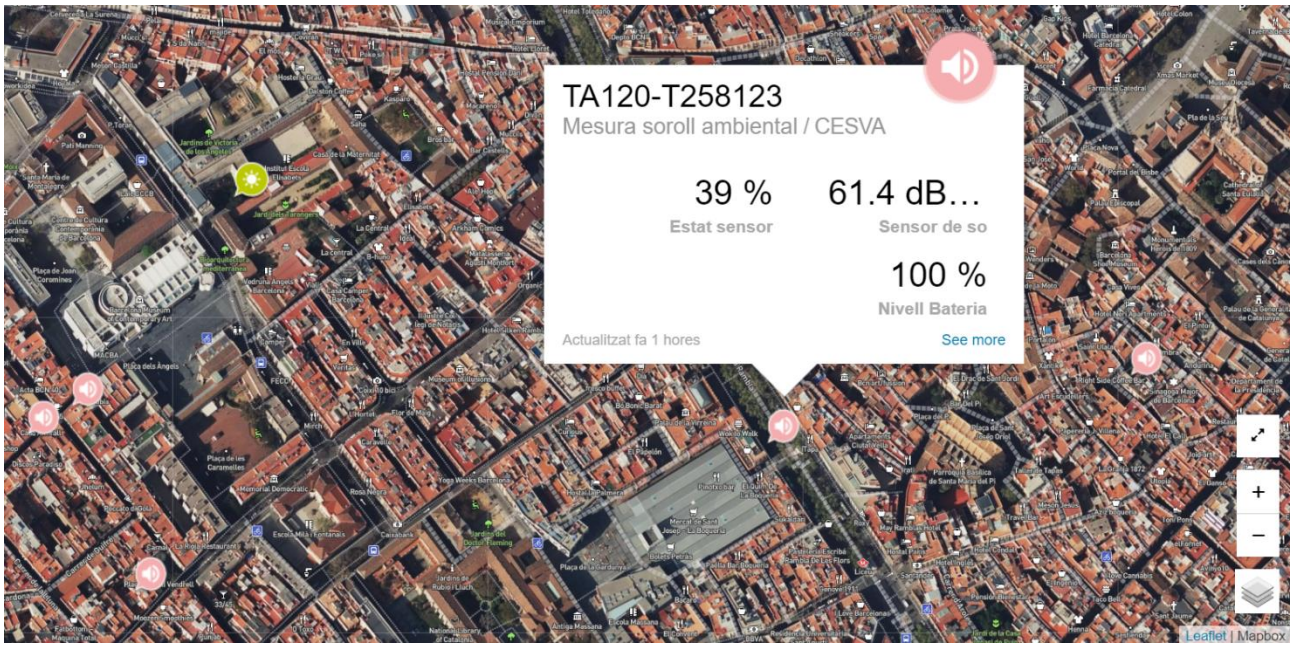
3. Use Case: Ideal for smart city solutions, integrating real sensors to manage urban services like traffic, waste, and energy.

4. Best Practices:

- Open-source model promotes adaptability and innovation.
- Flexible and scalable, with performance-focused architecture.

5. Opportunities: Enhance user experience, security, and predictive analytics features.





Case study - Water: *NYC'S energy and water performance map*

The NYC Energy & Water Performance Map provides an interactive data analysis platform covering 12 years of data on energy, water efficiency, and carbon emissions for nearly 30,000 of New York City's largest buildings

1.Benchmarking Ordinance - Local Law 84 (2009):

- **Local Law 84**, part of NYC's **Greener Greater Buildings Plan**, mandates annual reporting of energy and water consumption by:
  - Private buildings over **50,000 ft²** (reduced to **25,000 ft²** in 2017).
  - Public sector buildings over **10,000 ft²**.
- This law was one of the first of its kind in the U.S. and has served as a model for other cities aiming to reduce **greenhouse gas emissions** in buildings.

2. Data Coverage:

- The platform provides data on **energy and water consumption** and **greenhouse gas emissions** for all buildings covered by Local Law 84.

3. Purpose and Impact:

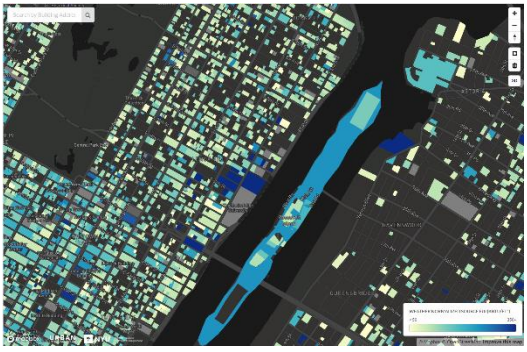
- The platform aims to help **property owners, tenants, and policymakers** make informed decisions by factoring in energy and water efficiency, as well as emissions.
- It supports **data-driven policy-making** to advance **climate action** and reduce emissions in the real estate sector.

4. Best Practices:

- **Transparency and Accountability**: Public disclosure of building performance data encourages improvements in energy efficiency.
- **Data-Driven Decision-Making**: The platform fosters informed real estate choices and supports the development of sustainability policies.

5. Opportunities:

- Expanding the platform's capabilities to provide predictive analytics and deeper insights could further enhance its utility for stakeholders focused on sustainability goals.



Case study - Waste: *Moda Re- (Clothing Bank Collections)*

Moda re- is Spain's largest clothing bank operator with +7,500 clothing banks and +125 stores. They use all funds raised from selling donated clothing to finance charitable projects that help vulnerable groups of people. Moda re- is a social project under the Caritas umbrella organization, which also includes A Todo Trapo and Koopera.

1. **Mentality**: Identify a problem

   Moda Re faced **inefficient collection routes** and **underutilized capacity** in recycling bins, resulting in unnecessary fuel consumption and higher CO2 emissions.

2. **Find a Solution**:
   - IoT sensors were installed in clothing collection bins to provide real-time data on bin fill levels.
   - The waste management system used this data to **optimize collection routes**, responding to actual need rather than relying on fixed schedules.
3. **Key Benefits**:
   - **Improved Efficiency**: Sensor-driven collection optimized routes, reducing unnecessary trips to half-empty bins.
   - **CO2 Emissions Reduction**: Optimized routing cut fuel usage, reducing **CO2 emissions by 35%**.
   - **Cost Savings**: Fewer trips resulted in reduced operational costs and resource consumption.
4. **Sustainability Impact**:

   By adopting this system, Moda Re improved operational efficiency while contributing to the **circular economy** and reducing their carbon footprint.
5. **Best Practices**:
   - **Data-Driven Operations**: IoT sensors enabled a shift from fixed to dynamic waste collection schedules.
   - **Sustainability Focus**: The case shows how integrating smart technologies can directly contribute to **environmental sustainability** while enhancing efficiency.

E. Conclusions

Key insights

Open Data and IoT technologies address several key challenges:

- **Resource Optimization**: IoT enables efficient resource management, particularly in water conservation, helping to mitigate resource scarcity.
- **Labor Shortage Mitigation**: By integrating advanced software tools, including AI and machine learning, IoT can reduce manual labor requirements, increasing operational efficiency.
- **Operational Cost Reduction**: Automation and intelligent adaptation of infrastructure, such as utility networks and public lighting, streamline operation and maintenance, leading to reduced costs.
- **Enhanced Threat Response**: IoT facilitates quicker responses to environmental challenges such as climate change and the impact of carbon taxation.
- **Streamlining Bureaucratic Processes**: The use of data-driven decision-making and digital planning promotes transparency, simplifies reporting, and enhances engagement with citizens, investors, and multisector stakeholders.
- **Urban Planning and Development**: IoT supports improved urban planning, including Green Deal investments and the acceleration of construction permitting processes.

The key findings from D.1.1.1 will inform the development of various activities aimed at improving the quality of Local Action Plans in the upcoming phases. The table below outlines proposed measures for project partners, along with anticipated outcomes the project aims to achieve upon completion. These findings will serve as the foundation for the next step: developing a methodology for Local Action Plans. Given its advanced state, the Olomouc case could function as a long-term pilot activity for investigating and testing proposed measures, with support from the project partners.

Key conclusions from D.1.1.1 and potential future steps for the project

Finding	Measure	Result
Environment and traffic are ideal domains for open IoT data implementation, as they do not involve personal data protection concerns.	Each Local Action plan should cover these two issues in a holistic way	A holistically designed map of IoT sensors for traffic and environmental monitoring, covering the entire city, with Olomouc serving as a pilot demonstration.
Drinking water data can be made openly accessible.	The project should explore methods for aggregating this data by location and time to minimize the risk of misuse.	A questionnaire targeting drinking water companies in the project areas will be conducted, with the findings incorporated into the Local Action Plans.
Wastewater management presents an additional opportunity, as it can yield significant energy and operational savings, creating a	Opening access to wastewater data may pose challenges; therefore, a questionnaire will be distributed to wastewater	The results of the questionnaire will be compiled and addressed as a key issue in the Local Action Plans.

demand for IoT and software solutions.	companies across all project areas.	
Accessing **energy data** is currently very challenging and often impossible to open.	The Local Action Plan development should investigate the potential for making certain energy data accessible.	The Local Action Plan will include a chapter on energy, but it will be assigned the lowest priority, categorized as a "nice to have" component.
A strategy for IoT open data is necessary.	The Local Action Plan should identify local stakeholders and develop a holistic approach to IoT data provision.	A map indicating potential microzoning within the city will be created based on best practices from Olomouc. This task is slated for 2025 and will be addressed as an issue in the Local Action Plan.
Ensuring the **sustainability of data sources** is crucial to overcoming barriers such as low data quality, accessibility issues, and data discontinuity.	The project will continue to refine the specifications for IoT open data as a public service.	Potential key outcomes include the development of a strategy or policy for IoT open data as a public service, the establishment of technical standards, and the design of a public dashboard layout.
The continuity of IoT operation beyond the project	Policy level, a draft of a strategy and business models for long term operation (as a public service)	IoT open data strategy as the final result of the project
Right placement of the sensors	Technical level, Olomouc case as a traffic and heat island IoT open data case with guidance and the HW and data requirements	Czech partners are investigating a possible technical standard on city IoT deployment
Accuracy of measurement		
Standard data formats and APIs		
Monitoring data quality and implementing necessary data cleaning processes are essential.	A policy-level analysis will be conducted, including a case study of Olomouc, with a potential pilot project on data quality monitoring still under consideration.	A service will be established focusing on data quality monitoring, detailing its requirements and associated costs.
Data storage and publication must establish clear terms for third-party access.	A policy-level analysis will be conducted, including a case study of Olomouc, to evaluate service levels and standardize the publication of IoT open data, along with associated costs.	The establishment of an IoT open data publication service.
Public engagement tools are needed to facilitate citizen interaction with IoT systems.	The project will further investigate opportunities for citizen participation, integration of citizen data sources, the design of a public dashboard, and the identification of relevant	A public dashboard layout will be developed, featuring "key information about my neighbourhood" derived from localized open data and open IoT data.

	information. This will also serve as a potential theme for hackathons.	
City/regional administrations have specific needs that require focused collection and analysis.	Each pilot area should prioritize gathering needs based on the gap analysis from D.1.2 and engage with identified staff to discuss their "nice to have" tools, aiming to align project activities with the actual needs of the city agenda.	A table of key use cases relevant to city agendas will be created, outlining how to support these needs with IoT data, providing a foundation for future software tools that can be shared.

These findings and proposed as future actions, derived from the generalized insights of the D.1.1.1 use cases, can be summarized as follows:

1. **Scale Up Multisensor Networks**: Expand the deployment of multisensor networks, particularly in areas susceptible to traffic congestion, urban heat islands, or air pollution, to gather comprehensive and real-time data that supports proactive policymaking.
2. **Enhance Data Accessibility and Updates**: Ensure that collected traffic and environmental data is accessible to both the public and decision-makers, with real-time updates to maintain its relevance and usability.
3. **Integrate IoT with Existing Infrastructure**: Continue integrating IoT technologies into existing systems, such as waste management, traffic flow, and energy efficiency, drawing lessons from the successes of cities like Prague, Barcelona, and London.
4. **Engagement of the Community**: Strengthen community engagement by providing easy access to environmental data and actively incorporating public feedback into urban planning processes.
5. **Foster Cross-Sector Collaboration**: Facilitate collaboration among local governments, technology companies, academia, and NGOs to ensure that projects address both local needs and global sustainability objectives.
6. **Leverage Policy for Sustainability**: Advocate for policies that mandate the adoption of sustainable technologies, such as smart meters and multisensor networks, to equip cities for the challenges posed by climate change.

Conclusions

The future activities of the project partners will lead to varying development paces across different project areas. The feasibility of these activities, which is still under assessment, will determine the potential for future twinning among areas. This evaluation will address whether a software tool developed using the same IoT open data in one city can be successfully implemented in another partner city, along with considerations of costs and necessary digital skills. The project is designed as a "learning by doing" initiative, which is why a diverse range of activities has been proposed. However, the current understanding of the success and utility of these activities remains limited. Local Action Plans should propose both uniform activities applicable to all areas and specific initiatives tailored to particular use cases.

Table of all best practices / case studies collected

Number	Which typology of data does the best practice / case study deals with?	Please add a weblink or a DOI for the Best practice / Case study reference.	Please add a weblink or a DOI (Digital Object Identifier) for the Best practice / Case study reference.2
1	Environment	London Air Quality Network	https://www.londonair.org.uk/LondonAir/Default.aspx
2	Environment	MeteoBlue	https://content.meteoblue.com/en/business-solutions/meteo-climate-services/city-climate/iot-station-network
3	Environment	Heat island of the city of Ústí nad Labem	https://storymaps.arcgis.com/stories/4e2a1e89367b4ab6a1093ce29afcee70
4	Environment	Temperature map of Ostrava	https://storymaps.arcgis.com/stories/d795b680610a401f96a1b096f4397ea7
5	Environment	Budapest Open Data map	https://atlo.team/boda/
6	Environment	Air pollution Hungary	https://legszennyezettseg.met.hu/levegominoseg/meresi-adatok/automata-merohalozat
7	Environment	microclimatic measurements for assessing the thermal environment in urban environments	https://praha.eu/web/portalzp/w/konzultacni-setkani-o-vyuziti-vysledku-mikroklimatickych-mereni-v-mestskem-prostredi-62024
8	Environment	Vulnerability of Pardubice to high temperatures and adaptation options - Heat map	https://pardubice.eu/zranitelnost-mesta-pardubice-vuci-vysokym-teplotam-a-moznosti-adaptaci-tepelna-mapa
9	Environment	Adaptation to climate change	[illegible]6.pdf
10	Environment, Traffic	Array of Things	https://arrayofthings.github.io/
11	Environment, Traffic	Orlová	* no link was provided
12	Environment, Traffic	Air Quality	https://docs.google.com/document/d/1g-HIMA2J5U_zg7Mk17BY3vYn_zqlSXcLM2LFOObkriU/edit#heading=h.ghucmq6jsduo
13	Environment, Traffic	Road Usage Insights IoT Case Study	https://docs.google.com/document/d/[illegible]/edit#heading=h.ghucmq6jsduo
14	Environment, Urban Heat Island related datasets	Urban Heat Island (IPR Praha)	https://iprpraha.cz/stranka/3910/urban-heat-island
15	Environment, Waste, Traffic	Barcelona IoT	https://datasmart.hks.harvard.edu/news/article/how-smart-city-barcelona-brought-the-internet-of-things-to-life-789
16	Environment, Water	Soil Sensor measuring	https://data.melbourne.vic.gov.au/explore/dataset/soil-sensor-locations/information/
17	Environment, Water	Harbor Water Quality	https://www.nyc.gov/site/dep/water/harbor-water-quality.page
18	Environment, Water	Zelená Plzeň (Green Pilsen) and Urban Heat Island	https://plzen.worldfromspace.cz/
19	Environment, Water	Telemareographic Network of the Venice Lagoon	https://www.comune.venezia.it/content/dati-dalle-stazioni-rilevamento
20	Environment, Water, Energy, Waste, Traffic	Golemio	https://golemio.cz/
21	Environment, Water, Energy, Waste, Traffic	#PripravBrno	https://pripravbrno.cz/
22	Environment, Water, Energy, Waste, Traffic	Geoportal of the Prešov self-governing region	https://geopresovregion.sk/geonetwork/srv/slo/catalog.search#/search?facet.q=sourceCatalog%2F4906851c-7de6-4f12-b75a-dde2bdaa5935&resultType=details&sortBy=relevance&fast=index&_content_type=json&from=1&to=20
23	Environment, Water, Energy, Waste, Traffic	Geoportal of the Košice self-governing region	https://www.geoportalksk.sk/home/
24	Environment, Water, Energy, Waste, Traffic, economics, housing, public services, education, R&D	Data Brno	https://data.brno.cz/
25	Pedestrian Counting	Pedestrian Counting System	https://data.casey.vic.gov.au/pages/counting-dashboard/
26	Pedestrian Counting	Digital Town Hub Case Study	https://docs.google.com/document/d/1itTlkwerkE0oqsMCjBr2d8XiXZN4xOXD/edit
27	Platform	Sentilo	https://www.sentilo.io/
28	Platform	Snap4City	https://www.snap4city.org/dashboardSmartCity/management/iframeApp.php?linkUrl=https://www.snap4city.org/drupal&linkId=snap4cityPortalLink&pageTitle=www.snap4city.org&fromSub
29	Traffic	WeCount	https://we-count.net/
30	Traffic	On-street Parking Bay	https://data.melbourne.vic.gov.au/explore/dataset/on-street-parking-bay-sensors/information/
31	Traffic	Traffic data analysis tool City of Zurich	https://www.stadt-zuerich.ch/portal/de/index/ogd/anwendungen/2023/verkehrsdatenanalyse_dav3.html
32	Traffic	Enhancing Public Transport Using Data	https://www.smartnation.gov.sg/initiatives/open-data-analytics/
33	Traffic	Park and Joy	https://www.telekom.com/en/media/media-information/archive/now-live-iot-network-for-germany-574364
34	Traffic	BKK Budapest Public Transport operator OD site	https://opendata.bkk.hu/data-sources
35	Traffic	Mapa dopravy Plzeň (Transport Map Pilsen)	https://mapadopravy.plzen.eu/
36	Traffic	Southern inner ring road in Ljubljana: 2021 data set from traffic sensors installed as part of the citizen science project WeCount	https://doi.org/10.1016/j.dib.2022.107878
37	Traffic	An integrative approach to neighbourhood sustainability assessments using publicly available traffic data	https://doi.org/10.1016/j.compenvurbsys.2022.101805
38	Traffic	Trnava self governing region bike data portal	www.cyklo.trnava-vuc.sk
39	Traffic	MHDPo	www.mhdpo.sk
40	Traffic	MoTiV - Dataset of European User Mobility for Behavioral-Data	https://motivproject.eu/
41	Traffic	Large-scale test data set for location problems	https://doi.org/10.1016/j.dib.2018.01.008
42	Traffic	smartPORT	https://www.hamburg-port-authority.de/en/hpa-360/smartport
43	Traffic	SmartPark	https://www.parking.net/parking-industry/smart-parking-ltd
44	Traffic, Pedestrian Counting	Pedestrian Counting System	https://data.melbourne.vic.gov.au/explore/dataset/pedestrian-counting-system-sensor-locations/information/?location=14,-37.8145,144.98095&basemap=mbs-7a7333
45	Traffic, Transit-Oriented Development; Walkability	Big and/or open data and transit-served area research	https://doi.org/10.1016/bs.atpp.2020.08.003
46	Waste	Moda re- (Clothing Bank Collections)	https://nordsense.com/cases-moda-re-collects-more-and-save-co2/
47	Waste	Promptly Preventing Sewer Overflows in Singapore	https://swan-forum.com/case-studies/promptly-preventing-sewer-overflows-in-singapore/
48	Waste	Fly Tipping IoT Case Study	https://docs.google.com/document/d/1hSWBKE7841pjDVbTncRzQL4ih0FuVWfzWfK17dqSNLU/edit#heading=h.ghucmq6jsduo
49	Water	River and Rainfall Monitoring using	https://publications.scss.tcd.ie/theses/diss/2019/TCD-SCSS-DISSERTATION-2019-023.pdf
50	Water	Town of Cary innovates flood prediction with IoT	https://azure.microsoft.com/en-us/blog/town-of-cary-innovates-flood-prediction-with-iot/
51	Water	Hungarian Water Open Data	https://data.vizugy.hu/
52	Water	Valencia	https://www.gsma.com/solutions-and-impact/technologies/internet-of-things/wp-content/uploads/2017/10/iot_omnium_10_17.pdf
53	Water	Gandia	https://www.idrica.com/wp-content/uploads/2020/07/202007-EN-Case-Study-The-digital-transformation-of-water-.pdf
54	Water	Damp and Mould IoT Case Study	https://docs.google.com/document/d/1sqNSSQZ6Btm2feWv0-F41FgIvT0S7KsjtDQ16T0OnGs/edit#heading=h.ghucmq6jsduo
55	Water	City of Cape Town's Water Map	https://use.metropolis.org/case-studies/city-of-cape-towns-water-map#casestudydetail
56	Water	Embracing IoT & Smart Metering For A Water Resilient Barcelona	https://utilitymagazine.com.au/success-story-suez-iot-barcelona/
57	Water, Energy	NYC Energy & Water Performance Map	https://energy.cusp.nyu.edu/#/
58	Water, Waste	SMART PUB	https://events.development.asia/system/files/materials/2020/11/202011-smart-water-management-singapore-experience.pdf
59		Eliminating Overflowing Waste	https://nordsense.com/cases-madrid/
60		Iuav Open Data	http://opendata.iuav.it/en/
61		VE14Open	https://sites.google.com/site/ve14open/executive-summary?authuser=0

Appendix. Collected best practices

In the appendix, we have included all 61 best practice examples, organized by data type. Each entry is summarized clearly on a single A4 page, providing a precise overview of the relevant data for easy reference. This structured approach ensures a comprehensive understanding of each example, while maintaining clarity and accessibility.

CityOne

What kind of the best practices / case study reference type are you suggesting?

Best practices, Projects

Which typology of data does the best practice / case study deals with?

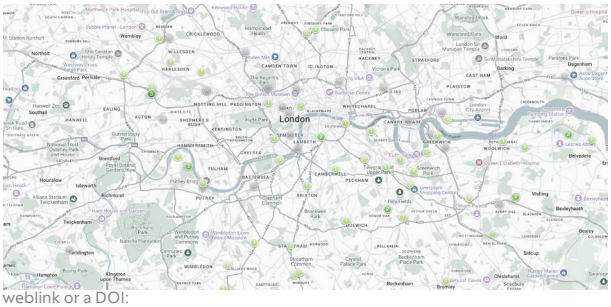
Environment

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

1.London Air Quality Network



weblink or a DOI:

https://www.londonair.org.uk/LondonAir/Default.aspx

Please provide a brief description or abstract of the proposed best practice / case study reference.

City of London created project LAQN in 1993. Since then they establish around 200 measuring sites around London. Goal of network is to measure air quality in the city of London. Measuring variables are carbon monoxide (CO), Nitrgo-en Dioxide (NO2), Suphur dioxide (SO2), Ozone (O3) and dust particles (PM10 and PM2,5)

Country: (list multiple countries if applicable)

UK

City/Region: (list multiple locations if applicable)

London

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

The network deployment helped to create an urban lab to understand pollution genration in big cities. The project tries to identify the influences like a difference between bus and bike travel. There was an increase in interest on pollu-tion by public and academia. It helped to find the biggest polluter: diesel cars

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

A bit chaotic, some stations have been canceled

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Through policy changes and regulations, Introduction of new technologies and infrastructure

For which pilot action do you think this reference source would be applicable?

Nova Gorica

At which territorial scale was the best practice / case study applied?

City

CityOne

What kind of the best practices / case study reference type are you suggesting?

Best practices, Projects

Which typology of data does the best practice / case study deals with?

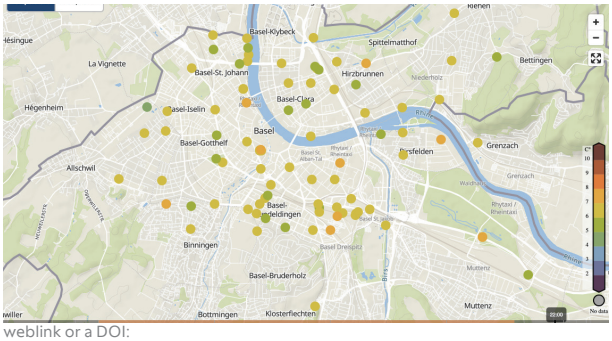
Environment

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

2. MeteoBlue



weblink or a DOI:
https://content.meteoblue.com/en/business-solutions/meteo-climate-services/city-climate/iot-station-network

Please provide a brief description or abstract of the proposed best practice / case study reference.

Air temperature, precipitation and relative humidity are measured in 15-minute resolution

Country: (list multiple countries if applicable)

Switzerland, Estonia

City/Region: (list multiple locations if applicable)

Basel, Zurich, Tallinn

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Basic climate statistics in larger area of the city

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Missing open data approach

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Introduction of new technologies and infrastructure

For which pilot action do you think this reference source would be applicable?

Olomouc

At which territorial scale was the best practice / case study applied?

City

Palacký University Olomouc

What kind of the best practices / case study reference type are you suggesting?

Educational material

Which typology of data does the best practice / case study deals with?

Environment

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

3. Heat island of the city of Ústí nad Labem

weblink or a DOI:
https://storymaps.arcgis.com/stories/4e2a1e89367b4ab6a1093ce29afcee70

Please provide a brief description or abstract of the proposed best practice / case study reference.

The measurement of air temperature, surface temperature and humidity was carried out on 19 July 2024 between 12.00-13.30 at selected locations in the centre of ÃšstÃ nad Labem. As a result, web story map is published on the city museum's website, part of the Regional Textbook of ÃšstÃ nad Labem.

Country: (list multiple countries if applicable)

Czechia

City/Region: (list multiple locations if applicable)

Ústí nad Labem

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Creation of public heat island risk awareness material

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

The real impact and reach of the output is unknown

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Educational programs and workshops

For which pilot action do you think this reference source would be applicable?

Olomouc

At which territorial scale was the best practice / case study applied?

City

Palacký University Olomouc

What kind of the best practices / case study reference type are you suggesting?

Studies

Which typology of data does the best practice / case study deals with?

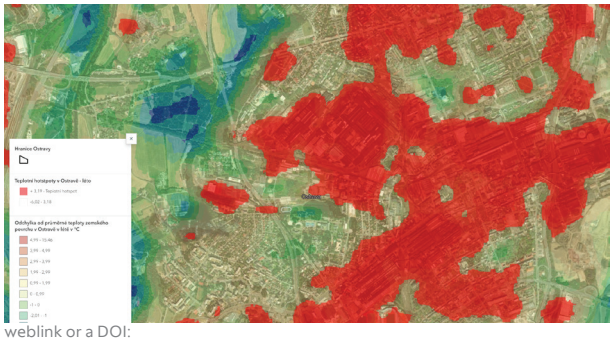
Environment

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

4. Temperature map of Ostrava



weblink or a DOI:
https://storymaps.arcgis.com/stories/d795b680610a401f96a1b096f4397ea7

Please provide a brief description or abstract of the proposed best practice / case study reference.

Researchers from the Technical University of Ostrava used the analysis of satellite images from 2018-2023, which have thermal bands, instead of data from meteorological stations to identify the urban heat island. The Landsat 8 and Landsat 9 satellites imagery provides surface temperatures.

Country: (list multiple countries if applicable)

Czechia

City/Region: (list multiple locations if applicable)

Ostrava

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **No**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

the study is available to the general public and raises awareness of the heat island problem

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Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Direct impacts of the study are unknown

How were the methodologies, studies, pilot programs, and projects implemented in real life?

For which pilot action do you think this reference source would be applicable?

Olomouc

At which territorial scale was the best practice / case study applied?

City

DKV Debrecen Exclusive Public Transport Company LTD

What is the name or title of the best practice / case study reference?

5. Budapest Open Data Map

What kind of the best practices / case study reference type are you suggesting?

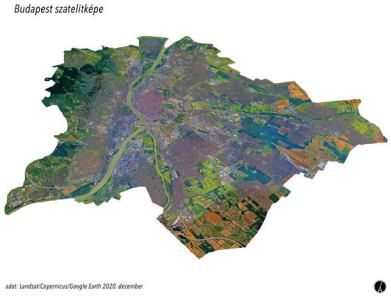
Best practices, Projects

Which typology of data does the best practice / case study deals with?

Environment

Geographic location:

Europe



weblink or a DOI:
https://legszennyezettseg.met.hu/levegominoseg/meresi-adatok/automata-merohalozat

Please provide a brief description or abstract of the proposed best practice / case study reference.

This best practice examines the implementation of an advanced air quality modeling framework in Hungary, aimed at improving public health and environmental management. The framework utilizes real-time data collection and sophisticated modeling techniques to analyze air pollution sources, dispersion patterns, and potential health impacts. By engaging stakeholders, including governmental agencies and local communities, the initiative fosters a collaborative approach to air quality management. The results demonstrate significant improvements in air quality monitoring, enhanced public awareness, and informed policy decisions, supporting the effectiveness of data-driven practices in territorial governance. This case serves as a model for other regions seeking to leverage data for better environmental outcomes and public health protection.

Country: (list multiple countries if applicable)

Hungary

City/Region: (list multiple locations if applicable)

Budapest

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

One of the most popular Weather websites has a dedicated page to show air pollution for the public: https://www.idokep.hu/szmog . This data is also gathered from the Air pollution Hungary website.

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

The data only seems available for major cities in Hungary and not covering the whole country.

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Development and deployment of mobile or web applications

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

Region

DKV Debrecen Exclusive Public Transport Company LTD

What kind of the best practices / case study reference type are you suggesting?

Best practices, Projects

Which typology of data does the best practice / case study deals with?

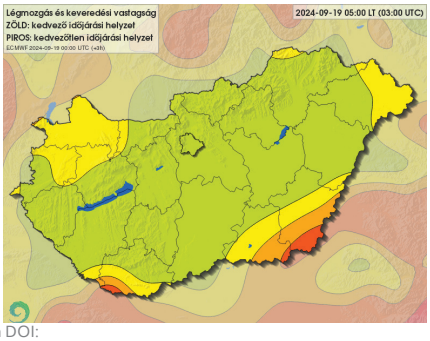
Traffic

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

6. Air pollution Hungary



weblink or a DOI:

https://opendata.bkk.hu/data-sources

Please provide a brief description or abstract of the proposed best practice / case study reference.

"The Budapest Transport Centre (BKK) serves as a case study for effective data-driven territorial governance, focusing on the integration of digital technologies to enhance urban mobility and service delivery. BKK's approach emphasizes the development of a comprehensive data management strategy that aligns with both local and European policy frameworks. BKK aims to establish robust data collection, processing, and sharing tools, fostering collaboration among district authorities and private sector stakeholders. This integrated framework is designed to support strategic objectives such as improving service efficiency, enhancing security, and reducing emissions. "

Country: (list multiple countries if applicable)

Hungary

City/Region: (list multiple locations if applicable)

Budapest

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Improved Service Efficiency: BKK has successfully utilized data analytics to optimize public transportation routes and schedules, leading to reduced wait times and increased reliability for commuters. This data-driven approach has enhanced overall service efficiency, making public transport more attractive to residents. Enhanced Decision-Making: The integration of real-time data collection and analysis has empowered BKK to make informed decisions regarding infrastructure investments and service improvements. This capability allows for a more responsive governance model that adapts to changing urban mobility needs. Citizen Engagement: BKK has fostered greater citizen participation

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Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Frequent PT schedule changes may effect BKK OD users that are not in direct communication with BKK.

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Introduction of new technologies and infrastructure, Development and deployment of mobile or web applications, Community engagement and participatory approaches, Pilot programs and small-scale trials

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

Region

Palacký University Olomouc

What kind of the best practices / case study reference type are you suggesting?

Studies

Which typology of data does the best practice / case study deals with?

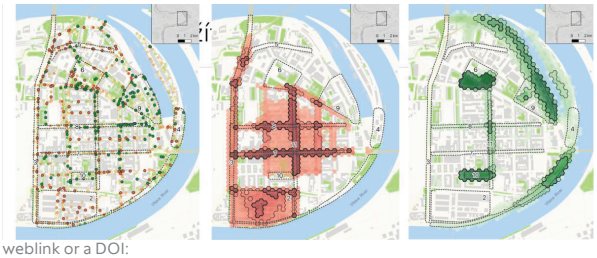
Environment

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

7. Microclimatic measurements for assessing the thermal environment in urban environments



weblink or a DOI:
https://praha.eu/web/portalzp/w/konzultacni-setkani-o-vyuziti-vysledku-mikroklimatickych-mereni-v-mestskem-prostredi-62024

Please provide a brief description or abstract of the proposed best practice / case study reference.

Results of the Microclimate Measurements in Urban Environments project, which explicitly addresses UHI + sensors. This link is to the workshop page on the project results. All in Czech, but very useful.

Country: (list multiple countries if applicable)

Czechia

City/Region: (list multiple locations if applicable)

Prague

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life?

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

How were the methodologies, studies, pilot programs, and projects implemented in real life?

For which pilot action do you think this reference source would be applicable?

Olomouc

At which territorial scale was the best practice / case study applied?

City

Palacký University Olomouc

What kind of the best practices / case study reference type are you suggesting?

Studies

Which typology of data does the best practice / case study deals with?

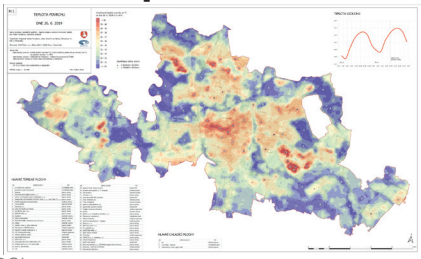
Environment

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

8. Vulnerability of Pardubice to high temperatures and adaptation options - Heat map



weblink or a DOI:
https://pardubice.eu/zranitelnost-mesta-pardubice-vuci-vysokym-teplotam-a-moznosti-adaptaci-tepelna-mapa

Please provide a brief description or abstract of the proposed best practice / case study reference.

Analytical document in relation to climate change adaptation issues. The main objective of the document is to analyze and characterize the areas, locations, or objects with the highest temperatures and intensity of overheating in the city and to determine the level of vulnerability, including possible risks in these locations. The document also outlines general recommendations for appropriate forms of adaptation measures. The document is intended to serve as a basis for a conceptual approach to the management of urban greenery and thus fulfil the strategic objective of improving

Country: (list multiple countries if applicable)

Czechia

City/Region: (list multiple locations if applicable)

Pardubice

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life?

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Through policy changes and regulations

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

City

Palacký University Olomouc

What kind of the best practices / case study reference type are you suggesting?

Studies, analytical document

Which typology of data does the best practice / case study deals with?

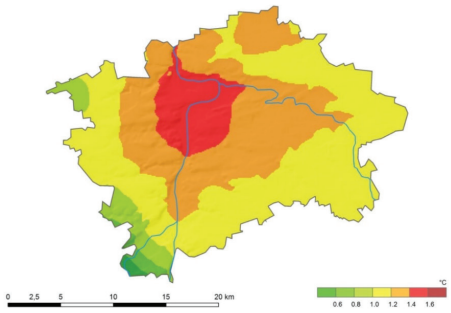
Environment

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

9.Adaptation to climate change



weblink or a DOI:
http://www.adaptacesidel.cz/data/upload/2016/09/Adaptace_kniha_ISBN-978-80-87756-09-6.pdf

Please provide a brief description or abstract of the proposed best practice / case study reference.

Quite old (2016), but a comprehensive view of the urban environment. A combination of different approaches, but not a sensor network. Created in the framework of the project Adaptation of settlements to climate change (http://www.adaptacesidel.cz/). Document is in Czech language.

Country: (list multiple countries if applicable)

Czechia

City/Region: (list multiple locations if applicable)

Hradec Králové

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life?

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Through policy changes and regulations

For which pilot action do you think this reference source would be applicable?

Olomouc

At which territorial scale was the best practice / case study applied?

City

CityOne

What kind of the best practices / case study reference type are you suggesting?

Pilot programs, Projects

Which typology of data does the best practice / case study deals with?

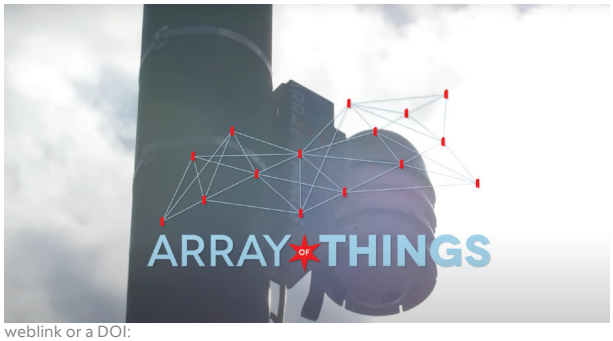
Environment, Traffic

Geographic location:

World

What is the name or title of the best practice / case study reference?

10. Array of Things



weblink or a DOI:

https://arrayofthings.github.io/

Please provide a brief description or abstract of the proposed best practice / case study reference.

Project focus was developing all-in one device, which will be put in cites blocks/districts. Device would measure air quality, sound, vibration, micro-climate and counting pedestrians.

Country: (list multiple countries if applicable)

USA

City/Region: (list multiple locations if applicable)

Chicago

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Large scale monitoring, 130 nodes, multisensor network.

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Duo to COVID-19 planned instalation has been put on-hold (Project planned increase numbers of measuring stations to additional 150 locations). Project was retired in September 2021.

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Introduction of new technologies and infrastructure

For which pilot action do you think this reference source would be applicable?

Nova gorica, Olomouc, Vicenza

At which territorial scale was the best practice / case study applied?

City

CityOne

What kind of the best practices / case study reference type are you suggesting?

Best practices, Projects

What is the name or title of the best practice / case study reference?

11. Orlová

Which typology of data does the best practice / case study deals with?

Environment, Traffic

Geographic location:

Europe

weblink or a DOI:

to be added, not ready yet

Please provide a brief description or abstract of the proposed best practice / case study reference.

City of Orlová has created a sensoric network for measuring cities weather conditions and heating islands. Measuring components are temperature (2m and 0,8m), humidity, air pressure, ground temperature (surface,6cm and 30cm), soil humidity, air quality, solar radiation, precepitation and vehicle detection for supermarkets parking sites occupancy. Each district has its own meteostation, they put meteostation on every major parking place subject to heating island and for reference validation of UHI, they put meteostation in parks, rural areas and forest park. Network has one

Country: (list multiple countries if applicable)

Czechia

City/Region: (list multiple locations if applicable)

Orlová

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Holistic approach made by expert design, Life Coala programme funding means 10 year sustainability, public procurement based on gaining the most points, the cost has been fixed, for a basic set + points for extra devices, big success as the winner is to deliver all the devices (would cost 3-4 times more), wider range of sensors will produce open data for many city agendas, will promote city as a green city,

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Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Project is on-going and should be finished around this year (2024)

How were the methodologies, studies, pilot programs, and projects implemented in real life?

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

City

CityOne

What kind of the best practices / case study reference type are you suggesting?

Studies, Projects

Which topic does the best practice / case study reference pertain to?

Environment, Traffic

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

12. Air Quality

weblink or a DOI:
https://docs.google.com/document/d/1g-HIMA2J5U_zgZMk1ZRY3vYn_zqISX-cLM2LEQObkrjU/edit#heading=h.ghucmq6jsduo

Please provide a brief description or abstract of the proposed best practice / case study reference.

Focus of this trial was whether school street schemes are effective in reducing air pollution around schools at key times of the day. Project used air quality monitoring sensors and sound sensors with automatic number plate recognition. Croydon, Kingston, Merton, Richmond and Sutton areas has been chosen for trial. Total numbers of sensors has been around 160 traffic and 108 air quality.

Country: (list multiple countries if applicable)

UK

City/Region: (list multiple locations if applicable)

London

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

The trial was successful; provided new way to see air quality data and increase awareness of the problem. One of the test area was including a waste collection site. Implementation of IoT was able to increase quality of air and decrease noise generation by 28-40 %.

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

For the schools air quality trial, the AQ colleagues didn't wish to engage with the schools and build a real programme. However, the units subsequently proved very useful for Highways colleagues, and Councillors loved them.

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Through policy changes and regulations, Introduction of new technologies and infrastructure, Community engagement and participatory approaches, Educational programs and workshops

For which pilot action do you think this reference source would be applicable?

Nova gorica

At which territorial scale was the best practice / case study applied?

City

CityOne

What kind of the best practices / case study reference type are you suggesting?

Best practices, Projects

Which topic does the best practice / case study reference pertain to?

Environment, Traffic

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

13. Road Usage Insights IoT Case Study

weblink or a DOI:
https://docs.google.com/document/d/1WfsNohiOhQHc10OxJXCPN8p7U6A-rohTdaVIhvTAMeGo/edit#heading=h.ghucmq6jsduo

Please provide a brief description or abstract of the proposed best practice / case study reference.

The project aimed to use IoT for real-time monitoring of traffic flow, various road users including cyclists and pedestrians, air quality (near schools), and footfall in parks and busy streets. The objective was to gain insights for improving road safety, reducing pollution, and enhancing public space utilisation. Sensors used in projects: traffic detection, air quality and footfall.

Country: (list multiple countries if applicable)

UK

City/Region: (list multiple locations if applicable)

London

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Traffic data led to an optimised road safety measures and congestion management. Air quality data informed policies for health protection in school areas. Public space use data aided in better parking management and urban planning.

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Emphasised the importance of multi-disciplinary collaboration, the value of real-time data for proactive management, and the necessity for ongoing technological adaptation. The challenge experienced was around reporting - generating outputs that specifically meet business needs was difficult and often involved a lot of data manipulation. Project have some problem with data error, but this errors ocurence has been decreased over duration of projects.

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Introduction of new technologies and infrastructure

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

City

Palacký University Olomouc

What kind of the best practices / case study reference type are you suggesting?

Studies, Projects

Which typology of data does the best practice / case study deals with?

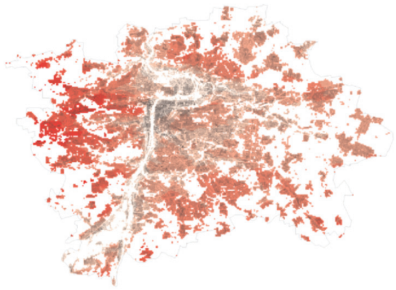
Environment, Urban Heat Island

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

14. Urban Heat Island (IPR Praha)



weblink or a DOI:

https://iprpraha.cz/stranka/3910/urban-heat-island

Please provide a brief description or abstract of the proposed best practice / case study reference.

The Urban Heat Island (UHI) project focuses on urban solutions for monitoring, modelling and urban solutions to the increasingly frequent extremely high temperatures of so-called heat islands in urban agglomerations resulting in increased air pollution in Central Europe.

Country: (list multiple countries if applicable)

Czechia

City/Region: (list multiple locations if applicable)

Prague

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Currently, a zoning study is being carried out for the Prague Bubny-Zatory district. The local residents were able to comment on the architectural study, hence the inclusion of participatory planning.

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

It is still a planning study and the project is already a year behind schedule. Legislation seems to have a negative impact on the implementation of the construction.

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Community engagement and participatory approaches, A zoning plan for future urban development

For which pilot action do you think this reference source would be applicable?

Olomouc

At which territorial scale was the best practice / case study applied?

City

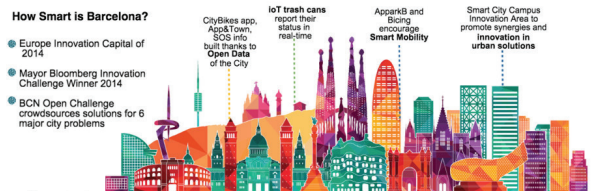
CityOne

What kind of the best practices / case study reference type are you suggesting?

Best practices, Projects

What is the name or title of the best practice / case study reference?

15. Barcelona IoT



Which typology of data does the best practice / case study deals with?

Environment, Waste, Traffic

Geographic location:

Europe

weblink or a DOI:
https://datasmart.hks.harvard.edu/news/article/how-smart-city-barcelona-brought-the-internet-of-things-to-life-789

Please provide a brief description or abstract of the proposed best practice / case study reference.

City of Barcelona started investing into IoT in 2012, since that they develop sensoric network around city. For energy efficiency they installed around 19,500 smart meters to optimize energy consumption, For waste they brought smart bins, with optimizing the collection routes and monitoring the waste levels. Next improvement was smart city lamp posts, which can detect nearby pedestrians. Barcelona has come up with IoT technologies which remotely control and sense the park irrigation as well as the water levels in the public fountains.

Country: (list multiple countries if applicable)

Spain

City/Region: (list multiple locations if applicable)

Barcelona

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Barcelona estimates that IoT systems have helped save $58 million on water, increased parking revenues by $50 million per year, and generated 47,000 new jobs. Through smart lighting, the city reports saving an addition $37 million annually.

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Some data sources are not functional (e.g. meteostations)

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Introduction of new technologies and infrastructure

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

City

CityOne

What kind of the best practices / case study reference type are you suggesting?

Projects

Which typology of data does the best practice / case study deals with?

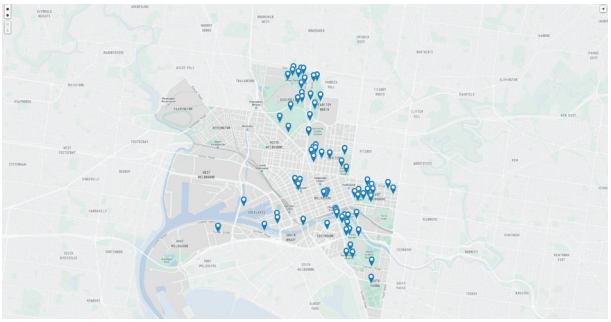
Environment, Water

Geographic location:

World

What is the name or title of the best practice / case study reference?

16. Soil Sensor measuring



weblink or a DOI:
https://data.melbourne.vic.gov.au/explore/dataset/soil-sensor-locations/information/

Please provide a brief description or abstract of the proposed best practice / case study reference.

City of Melbourne has created around 85 measuring sites for measuring salinity, temperature and moisture.

Country: (list multiple countries if applicable)

Australia

City/Region: (list multiple locations if applicable)

Melbourne

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Good number of sites

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Data is not much accessible, updates are missing, only 4700 data downloads, chaotic, only historic data, not up to date

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Introduction of new technologies and infrastructure

For which pilot action do you think this reference source would be applicable?

Vicenza

At which territorial scale was the best practice / case study applied?

City

CityOne

What kind of the best practices / case study reference type are you suggesting?

Projects

Which typology of data does the best practice / case study deals with?

Environment, Water

Geographic location:

World

What is the name or title of the best practice / case study reference?

17. Harbor Water Quality

weblink or a DOI:

https://www.nyc.gov/site/dep/water/harbor-water-quality.page

Please provide a brief description or abstract of the proposed best practice / case study reference.

City of New York established a sensoric network for measuring quality of sea water nearby cities harbors. They create around 85 measuring locations where they measure pH, wind, bacteria, salinity and others. Number of measuring variables is around 80. Data are colected every week.

Country: (list multiple countries if applicable)

USA

City/Region: (list multiple locations if applicable)

New York

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

With this sensoric network city of New York was able to create Sentinel monitoring program. The program uses measuring provided by sensors to detect abnormality in water. They warn authorities with the alarms. Autorities then establish field investigation for localization of source of problem. Multisensor, since 1909 statistics

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Not up to date, Last visible measuring was in 2023 according data preview.

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Introduction of new technologies and infrastructure

For which pilot action do you think this reference source would be applicable?

At which territorial scale was the best practice / case study applied?

City

Palacký University Olomouc

What kind of the best practices / case study reference type are you suggesting?

Studies, Map application

Which typology of data does the best practice / case study deals with?

Environment, Water

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

18. Zelená Plzeň (Green Pilsen) and Urban Heat Island

weblink or a DOI:

https://plzen.worldfromspace.cz/

Please provide a brief description or abstract of the proposed best practice / case study reference.

Map application (updated/live, with a look into the past) + provide directly also satellite data used in the application (https://plzen-data.worldfromspace.cz/?prefix=Plzen/; the same for Brno - https://plzen-data.worldfromspace.cz/?prefix=Brno/). The web-based map application is a product for Smart Cities developed by World From Space.

Country: (list multiple countries if applicable)

Czechia

City/Region: (list multiple locations if applicable)

Plzeň (Pilsen)

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life?

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Development and deployment of mobile or web applications

For which pilot action do you think this reference source would be applicable?

Olomouc

At which territorial scale was the best practice / case study applied?

City

CityOne

What kind of the best practices / case study reference type are you suggesting?

Best practices, Projects

Which topic does the best practice / case study reference pertain to?

Environment, Water

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

19. Telemareographic Network of the Venice Lagoon

weblink or a DOI:
https://www.comune.venezia.it/content/dati-dalle-stazioni-rilevamento

Please provide a brief description or abstract of the proposed best practice / case study reference.

In City of Venice they create a measuring network with 15 automatic stations. Main goal of this project is to observe 'high water'. Prime measuring variable is sea level. Some station measure other weather parametes such as wind, temperature, humidity, precitipation and solar radiation.

Country: (list multiple countries if applicable)

Italy

City/Region: (list multiple locations if applicable)

Venice

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Warning systems for flooding and providing critical analysis to understand floods. Well designed for informing how flood are measured.

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

No platform for providing data. It is designed more for scienties and research that public use.

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Introduction of new technologies and infrastructure, Educational programs and workshops

For which pilot action do you think this reference source would be applicable?

At which territorial scale was the best practice / case study applied?

City

Palacký University Olomouc

What kind of the best practices / case study reference type are you suggesting?

Projects, portal with best practices projects using open data

Which typology of data does the best practice / case study deals with?

Environment, Water, Energy, Waste, Traffic

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

20. Golemio

weblink or a DOI:

https://golemio.cz/

Please provide a brief description or abstract of the proposed best practice / case study reference.

The portal contains various open data, including topics on transport and climate/meteorological issues. It's not explicitly about UHI (urban heat island), but it can be used through a combination of data sources. They have done a lot of data-driven projects on transport (and public transport), energy consumption of buildings, use of IoT and sensors for indoor microclimate and more. Geographically, they operate mainly in Prague and its surroundings.

Country: (list multiple countries if applicable)

Czechia

City/Region: (list multiple locations if applicable)

Prague

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Most of the projects have been implemented in real practice, all in the theme of smart city and improving the quality of life in the city.

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

NA

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Through policy changes and regulations, Introduction of new technologies and infrastructure, Community engagement and participatory approaches, Pilot programs and small-scale trials

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

City

Palacký University Olomouc

What kind of the best practices / case study reference type are you suggesting?

Best practices, Studies, Pilot programs, Projects

Which typology of data does the best practice / case study deals with?

Environment, Water, Energy, Waste, Traffic

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

21. #PripravBrno

weblink or a DOI:

https://priprav.brno.cz/

Please provide a brief description or abstract of the proposed best practice / case study reference.

Linked to the Sustainable Energy and Climate Action Plan (SECAP) strategy, the portal includes a Solar Map (from CzechGlobe - more here https://in.brno.cz/delat-v-brne-vedu-je-in/vyuziti-vedy-pro-zivot-v-brne/) or a night map. Topics: energy, transport (sustainable passenger, eco-public), greenery, water, lighting, waste...Then also here https://storymaps.arcgis.com/stories/d1903b961b5644f3b9f6ce2bdaf2a56a (which is part of https://priprav.brno.cz/aktuality/tepelny-ostrov-mesta-brna/)

Country: (list multiple countries if applicable)

Czechia

City/Region: (list multiple locations if applicable)

Brno

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Many of the intentions of this Brno initiative have been put into practice.

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

NA

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Through policy changes and regulations, Introduction of new technologies and infrastructure, Community engagement and participatory approaches, Pilot programs and small-scale trials, Educational programs and workshops

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

City

University of Žilina

What kind of the best practices / case study reference type are you suggesting?

Best practices, Pilot programs, Projects

Which typology of data does the best practice / case study deals with?

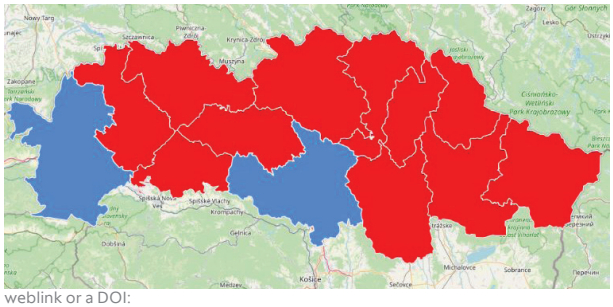
Environment, Water, Energy, Waste, Traffic

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

22. Geoportal of the Prešov self-governing region



weblink or a DOI:

https://shorturl.at/uqzx8

Please provide a brief description or abstract of the proposed best practice / case study reference.

"Within the EC and The World Bank support and the implementation of the Cathing up Region Initiative, Prešov Self-governing (PSK) region in Slovakia built Geoportal which serves as a platform for integration, storage and publication of spatial data about the region. The PSK geoportal combines a catalog of open geospatial data, a map browser, thematic maps and dashboards. The goal of the geoportal is to enhance data driven decisions of the self-governing region to decrease regional discrepancies and to promote regional development.
Geoportal is based on Open Source Software that prevent from vendor lock-in. "

Country: (list multiple countries if applicable)

Slovakia

City/Region: (list multiple locations if applicable)

Prešov self-governing region

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Geoportal became an integral part of the bussiness operation in the PSK. After succesfull implementation, geoportal with the same technologies and funcionalities was deployed also in Košice self-governing region. It contributes to capacity building (data literacy, data skills) within and beyond PSK and increase awareness in the are of (open) geospatial data, OSS technologies and data driven policies.

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

To ensure sustainibility of the project

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Through policy changes and regulations, Introduction of new technologies and infrastructure, Community engagement and participatory approaches, Pilot programs and small-scale trials

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

Region

University of Žilina

What kind of the best practices / case study reference type are you suggesting?

Best practices, Pilot programs, Projects

Which typology of data does the best practice / case study deals with?

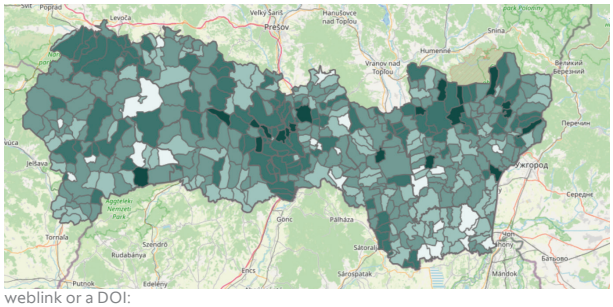
Environment, Water, Energy, Waste, Traffic

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

23. Geoportal of the Košice self-governing region



weblink or a DOI:

https://www.geoportalksk.sk/home/

Please provide a brief description or abstract of the proposed best practice / case study reference.

“Within the EC and The World Bank support and the implementation of the Cathing up Region Initiative, Košice Self-governing (KSK) region in Slovakia built Geoportal which serves as a platform for integration, storage and publication of spatial data about the region. The KSK geoportal combines a catalog of open geospatial data, a map browser, thematic maps and dashboards. The goal of the geoportal is to enhance data driven decisions of the self-governing region to decrease regional discrepancies and to promote regional development.
Geoportal is based on Open Source Software that prevent from vendor lock-in. “

Country: (list multiple countries if applicable)

Slovakia

City/Region: (list multiple locations if applicable)

Košice self-governing region

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Geoportal became an integral part of the bussiness operation in the KSK. It contributes to capacity building (data literacy, data skills) within and beyond KSK and increase awareness in the are of (open) geospatial data, OSS technologies and data driven policies.

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

To ensure sustainibility of the project

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Through policy changes and regulations, Introduction of new technologies and infrastructure, Community engagement and participatory approaches, Pilot programs and small-scale trials

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

Region

Palacký University Olomouc

What kind of the best practices /
case study reference type are you suggesting?

Open data portal

Which typology of data does the best practice /
case study deals with?

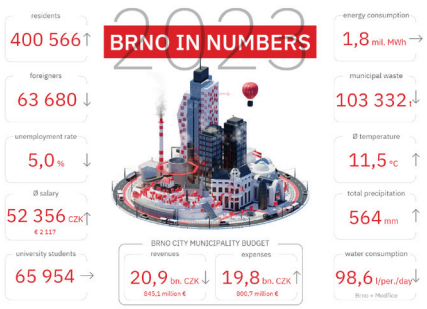
Environment, Water, Energy, Waste, Traffic, economics, housing, public services, education, R&D

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

24. Data Brno



weblink or a DOI:

https://data.brno.cz/

Please provide a brief description or abstract of the proposed best practice / case study reference.

This is a classic open data portal covering a variety of topics. In addition, it also includes (in connection with our project) thematic open data on "nature" - for example "How green is Brno", air, green roofs, surface temperature, etc.

Country: (list multiple countries if applicable)

Czechia

City/Region: (list multiple locations if applicable)

Brno

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life?

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

How were the methodologies, studies, pilot programs, and projects implemented in real life?

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

City

Which typology of data does the best practice / case study deals with?

Environment, Water, Energy, Waste, Traffic, economics, housing, public services, education, R&D

CityOne

What kind of the best practices / case study reference type are you suggesting?

Projects

Which typology of data does the best practice / case study deals with?

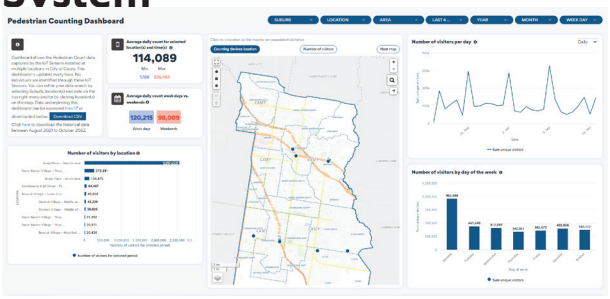
Pedestrian Counting

Geographic location:

World

What is the name or title of the best practice / case study reference?

25. Pedestrian Counting System



weblink or a DOI:

https://data.casey.vic.gov.au/pages/counting-dashboard/

Please provide a brief description or abstract of the proposed best practice / case study reference.

City of Casey deployed IoT Sensors for counting pedestrians. Total number of measuring locations are 6 with around 30 measuring devices.

Country: (list multiple countries if applicable)

Australia

City/Region: (list multiple locations if applicable)

Casey

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Measuring high density of people but only on few sites

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Melbourne is better

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Introduction of new technologies and infrastructure

For which pilot action do you think this reference source would be applicable?

Debrecen, Nova gorica, Olomouc, Žilina

At which territorial scale was the best practice / case study applied?

City

CityOne

What kind of the best practices / case study reference type are you suggesting?

Pilot programs

Which topic does the best practice / case study reference pertain to?

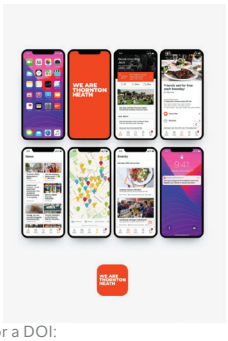
Pedestrian Counting

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

26. Digital Town Hub Case Study



weblink or a DOI:
https://docs.google.com/document/d/1itTlkwerkE0oqsMCjBr2d8XiXZN4xOXD/edit

Please provide a brief description or abstract of the proposed best practice / case study reference.

Focus of project was creating â€œdigital town hubsâ€ . This hub was accessible with use of smartphone app. Main focus was installing footfall sensors in front of local shops.

Country: (list multiple countries if applicable)

UK

City/Region: (list multiple locations if applicable)

London

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Open data, Enhanced Business Visibility, Real-time Engagement, Community Connection, Anonymized Data Insights

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Digital Literacy Challenges, Technology Scepticism, Resource Limitations

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Through policy changes and regulations, Development and deployment of mobile or web applications, Community engagement and participatory approaches, Pilot programs and small-scale trials

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

City, Region

CityOne

What kind of the best practices / case study reference type are you suggesting?

Best practices, Projects

Which typology of data does the best practice / case study deals with?

Platform

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

27. Sentilo

weblink or a DOI:

https://www.sentilo.io/

Please provide a brief description or abstract of the proposed best practice / case study reference.

Sentilo is a platform designed to connect real sensors with applications which are used for urban services. Project of creating Sentilo started in 2012 with colaboration of The Barcelona City Council and Municipal institute of Informatics. Sentilo platform is open source with a main goal to promote easy accesibility. Sentilo provides this service: front-end for message processing, with a simple REST API, an administration console for configure the system and manage the catalog, a data storage database, aimed to acomplish high performance rates, A non-SQL database, in order to get a more flexible and scalable system, A universal viewer, provided as a public demo that can be used as a starting point for specific business visualizers.

Country: (list multiple countries if applicable)

Spain

City/Region: (list multiple locations if applicable)

Barcelona

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Escape from ICT vertical solutions organized in silos. Reduce dependency on specific technologies, solutions or providers Avoid isolated compartments where the applications cannot access data from other applications. Minimize duplicity and multiplicity of data and infrastructures. Lower investments and maintenance costs. Sentilo as open software

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Through policy changes and regulations, Introduction of new technologies and infrastructure, Development and deployment of mobile or web applications

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

City, Region

CityOne

What kind of the best practices / case study reference type are you suggesting?

Projects

Which topic does the best practice / case study reference pertain to?

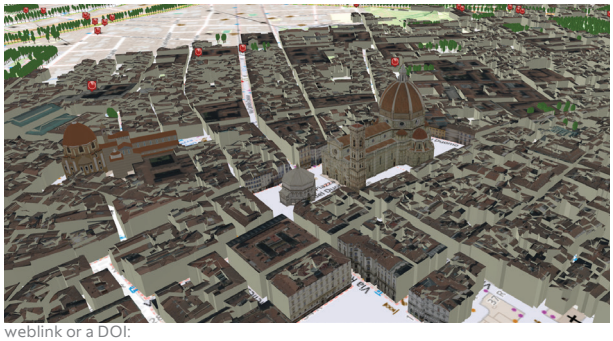
Platform

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

28. Snap4City



weblink or a DOI:

https://www.snap4city.org

Please provide a brief description or abstract of the proposed best practice / case study reference.

Snap4City solution which is fully open source, supports cloud and scalability for processing and IOT/IOE, respects user needs and privacy according GDPR and to the different user kinds, provides tools and community for co-creation; mix of data driven, stream and batch processing; it is fully based on microservices and uses easily replaceable tools.

Country: (list multiple countries if applicable)

Italy

City/Region: (list multiple locations if applicable)

Florence

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Snap4City is 100% open source, secure encrypted, scalable, modular and flexible. Allow custom dashboards for any IoT project. Allow unite all dashboard for cites projects (Like Florence Metropolitan City).

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

First impresion of website is not good. Difficult to operate.

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Introduction of new technologies and infrastructure, Development and deployment of mobile or web applications, Community engagement and participatory approaches, Pilot programs and small-scale trials, Educational programs and workshops

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

City, Region

University of Ljubljana

What kind of the best practices / case study reference type are you suggesting?

Best practices, Pilot programs, Projects, Journal articles

Which typology of data does the best practice / case study deals with?

Traffic, walkability

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

29. WeCount

weblink or a DOI:

https://we-count.net/

Please provide a brief description or abstract of the proposed best practice / case study reference.

WeCount aims to empower citizens to take a leading role in the production of data, evidence and knowledge around mobility in their own neighborhoods, and at street level. The project will follow participatory citizen science methods to co-create and use innovative low cost, automated, road traffic counting sensors (i.e. Telraam) and multi-stakeholder engagement mechanisms in 5 pilots in Madrid, Ljubljana, Dublin, Cardiff and Leuven.

Country: (list multiple countries if applicable)

Slovenia, Belgium, UK, Ireland and Spain

City/Region: (list multiple locations if applicable)

Ljubljana, Leuven, Bristol, Dublin and Madrid

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

The WeCount project successfully enhanced community engagement by empowering citizens to collect and analyze local traffic data, leading to informed decision-making and targeted interventions for traffic and environmental improvements. The project improved data availability and quality, influencing traffic policies and fostering sustainable travel behaviors. Additionally, the methodologies and tools developed demonstrated scalability and inspired similar initiatives in other communities, amplifying the project's impact.

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

The WeCount project faced several challenges and negative outcomes, including technical issues with sensor reliability and data accuracy, which sometimes led to gaps in data collection. Additionally, there was a significant learning curve for participants, requiring substantial training and support to ensure effective data handling and analysis. Moreover, sustaining long-term community engagement proved difficult, as maintaining participant motivation and involvement over extended periods was challenging.

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Through policy changes and regulations, Introduction of new technologies and infrastructure, Development and deployment of mobile or web applications, Community engagement and participatory approaches, Pilot programs and small-scale trials, Educational programs and workshops

For which pilot action do you think this reference source would be applicable?

Nova gorica, All of them

At which territorial scale was the best practice / case study applied?

City

CityOne

What kind of the best practices / case study reference type are you suggesting?

Best practices, Projects

Which typology of data does the best practice / case study deals with?

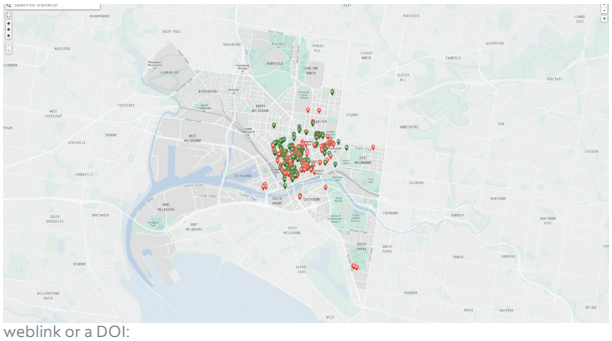
Traffic

Geographic location:

World

What is the name or title of the best practice / case study reference?

30. On-street Parking Bay



weblink or a DOI:
https://data.melbourne.vic.gov.au/explore/dataset/on-street-parking-bay-sensors/information/

Please provide a brief description or abstract of the proposed best practice / case study reference.

Sensoric network in-ground car parking has been deployed in city of Melbourne since 2023. Numbers of parking location are around 6 000. City provides an online map with parking spots and they use two color marking if car is present or not. Update frequency is 2 minutes.

Country: (list multiple countries if applicable)

Australia

City/Region: (list multiple locations if applicable)

Melbourne

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Large scale, update frequency very often, high interest in data: 0,5mil. downloads

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Parking Sensors are not operational on Public Holidays. Parking Sensors will show car parks as vacant when blocked by construction zones.

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Introduction of new technologies and infrastructure, Development and deployment of mobile or web applications

For which pilot action do you think this reference source would be applicable?

Debrecen, Olomouc, Žilina

At which territorial scale was the best practice / case study applied?

City

CityOne

What kind of the best practices / case study reference type are you suggesting?

Best practices, Projects

Which typology of data does the best practice / case study deals with?

Traffic

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

31. Traffic data analysis tool City of Zurich

weblink or a DOI:
https://www.stadt-zuerich.ch/portal/de/index/ogd/anwendungen/2023/verkehrsdatenanalyse_dav3.html

Please provide a brief description or abstract of the proposed best practice / case study reference.

Zurich built IoT network with focus on counting vehicles. This measuring sites has been establish in 2012. Numbers of counting locations is 215 and measuring frequency is 1 hour.

Country: (list multiple countries if applicable)

Switzerland

City/Region: (list multiple locations if applicable)

Zurich

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Traffic volumes on many sites, providing trends (comparison of years)

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Distinguishing between vehicle classes, missing zones monitoring, only profiles, data granularity in hours only

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Introduction of new technologies and infrastructure

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

City

CityOne

What kind of the best practices / case study reference type are you suggesting?

Projects

Which typology of data does the best practice / case study deals with?

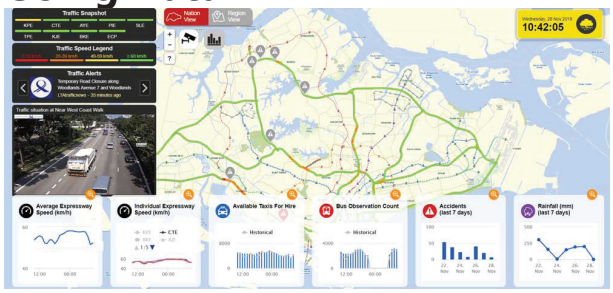
Traffic

Geographic location:

World

What is the name or title of the best practice / case study reference?

32. Enhancing Public Transport Using Data



weblink or a DOI:

https://www.smartnation.gov.sg/initiatives/open-data-analytics/

Please provide a brief description or abstract of the proposed best practice / case study reference.

Project focuses on instaling tracking IoT sensors on transport systems in cites.

Country: (list multiple countries if applicable)

Singapore

City/Region: (list multiple locations if applicable)

Singapore

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

92% reduction in the number of bus services with crowding issues, despite a year-on-year increase in average daily bus ridership. 3- to7-minute reduction in the average waiting time on popular bus services. Project was used with third-arty transport apps (Bus Uncle chatbot)

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Introduction of new technologies and infrastructure

For which pilot action do you think this reference source would be applicable?

Debrecen

At which territorial scale was the best practice / case study applied?

City

CityOne

What kind of the best practices / case study reference type are you suggesting?

Projects

What is the name or title of the best practice / case study reference?

33. Park and Joy

weblink or a DOI:
https://www.telekom.com/en/media/media-information/archive/now-live-iot-network-for-germany-574364

Which typology of data does the best practice / case study deals with?

Traffic

Geographic location:

Europe

Please provide a brief description or abstract of the proposed best practice / case study reference.

Application using cites IoT for finding free parking space around 50 cities in Germany

Country: (list multiple countries if applicable)

Germany

City/Region: (list multiple locations if applicable)

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Development and deployment of mobile or web applications

For which pilot action do you think this reference source would be applicable?

At which territorial scale was the best practice / case study applied?

City, Region

DKV Debrecen Exclusive Public Transport Company LTD

What kind of the best practices / case study reference type are you suggesting?

Best practices, Projects

Which typology of data does the best practice / case study deals with?

Traffic

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

34. BKK Budapest Public Transport operator OD site

weblink or a DOI:

https://opendata.bkk.hu/data-sources

Please provide a brief description or abstract of the proposed best practice / case study reference.

"The Budapest Transport Centre (BKK) serves as a case study for effective data-driven territorial governance, focusing on the integration of digital technologies to enhance urban mobility and service delivery. BKK's approach emphasizes the development of a comprehensive data management strategy that aligns with both local and European policy frameworks. BKK aims to establish robust data collection, processing, and sharing tools, fostering collaboration among district authorities and private sector stakeholders. This integrated framework is designed to support strategic objectives such as improving service efficiency, enhancing security, and reducing emissions. "

Country: (list multiple countries if applicable)

Hungary

City/Region: (list multiple locations if applicable)

Budapest

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Improved Service Efficiency: BKK has successfully utilized data analytics to optimize public transportation routes and schedules, leading to reduced wait times and increased reliability for commuters. This data-driven approach has enhanced overall service efficiency, making public transport more attractive to residents. Enhanced Decision-Making: The integration of real-time data collection and analysis has empowered BKK to make informed decisions regarding infrastructure investments and service improvements. This capability allows for a more responsive governance model that adapts to changing urban mobility needs. Citizen Engagement: BKK has fostered greater citizen participation

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Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Frequent PT schedule changes may effect BKK OD users that are not in direct communication with BKK.

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Introduction of new technologies and infrastructure, Development and deployment of mobile or web applications, Community engagement and participatory approaches, Pilot programs and small-scale trials

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

Region

Palacký University Olomouc

What kind of the best practices / case study reference type are you suggesting?

Best practices

Which typology of data does the best practice / case study deals with?

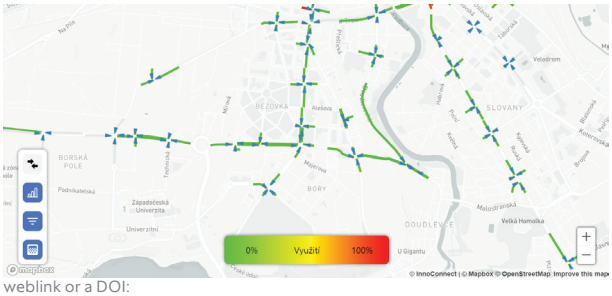
Traffic

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

35. Mapa dopravy Plzeň (Transport Map Pilsen)



weblink or a DOI:

https://mapadopravy.plzen.eu/

Please provide a brief description or abstract of the proposed best practice / case study reference.

Analytical map of traffic intensity measured by traffic detectors placed at traffic lights in Pilsen. Live application with data from 2017. Excellent application.

Country: (list multiple countries if applicable)

Czechia

City/Region: (list multiple locations if applicable)

Plzeň (Pilsen)

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

near-realtime monitoring of the traffic in the city

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Development and deployment of mobile or web applications

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

City

University of Ljubljana

What kind of the best practices / case study reference type are you suggesting?

Studies, Journal articles

Which typology of data does the best practice / case study deals with?

Traffic

What is the name or title of the best practice / case study reference?

36. Southern inner ring road in Ljubljana: 2021 data set from traffic sensors installed as part of the citizen science project WeCount

Geographic location:

Europe

weblink or a DOI:

https://doi.org/10.1016/j.dib.2022.107878

Please provide a brief description or abstract of the proposed best practice / case study reference.

The southern inner ring road in Ljubljana, Slovenia was equipped with low-cost sensors supported by the Telraam integrated platform. The sensors were built with open-source components (Raspberry PI). Data is collected and analysed via an internet portal (www.telraam.com). The Telraam sensor counts pedestrians, cyclists, cars and freight/heavy vehicles using the images provided by the device sensor and the analysis performed by the Raspberry PI (a small computer on which the device is based). The sensor software uses the size and speed of the passing object to determine and classify the different vehicles. The classification is based on the average observed full value and the axis ratio of each observed object (which meets a set of criteria that helps filter out any movement in the field of view that should be associated with road users). The five traffic sensors camera is mounted directly on the inside of the window glass facing the street at varying distances from the road (from 3 to 15 meters), where they count traffic only during daylight hours, update their count every hour and separate car traffic by direction.

Country: (list multiple countries if applicable)

Slovenia

City/Region: (list multiple locations if applicable)

Ljubljana

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

How were the methodologies, studies, pilot programs, and projects implemented in real life?

as part of the WeCount project

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

City

University of Ljubljana

What kind of the best practices / case study reference type are you suggesting?

Best practices, Studies, Pilot programs, Projects, Journal articles

Which topic does the best practice / case study reference pertain to?

Traffic

What is the name or title of the best practice / case study reference?

37. An integrative approach to neighbourhood sustainability assessments using publicly available traffic data

Geographic location:

Europe

weblink or a DOI:

https://doi.org/10.1016/j.compenvurbsys.2022.101805

Please provide a brief description or abstract of the proposed best practice / case study reference.

This study introduces a framework for neighborhood sustainability assessments (NSA) that leverages publicly available traffic data to quantify network performance, a crucial aspect of sustainable urban development. The framework emphasizes the importance of travel time reliability and variability as indicators for assessing urban sustainability. It employs a hybrid and modular approach, integrating various datasets and employing cosinor regression methods to analyze the rhythmic behavior of travel times across different conditions, such as route, day type, and weather.

Country: (list multiple countries if applicable)

Slovenia

City/Region: (list multiple locations if applicable)

Ljubljana

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

enhanced travel time reliability, improved network performance insights, modular data integration, improved predictive capabilities, built a framework for future assessments

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

data integration issues, nonlinear traffic flow characteristics, limited adoption of travel time reliability metrics, limited resources, short-term observations limitations

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Introduction of new technologies and infrastructure, Pilot programs and small-scale trials

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

City

University of Žilina

What kind of the best practices / case study reference type are you suggesting?

Projects

Which typology of data does the best practice / case study deals with?

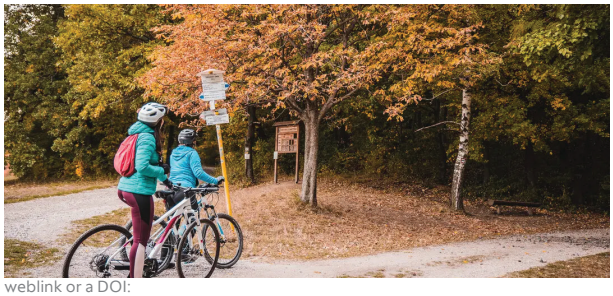
Traffic

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

38. Trnava self governing region bike data portal



weblink or a DOI:

www.cyklo.trnava-vuc.sk

Please provide a brief description or abstract of the proposed best practice / case study reference.

Trnava self governing region created portal based on ArcGIS technology with data and visualisation on bike sensors, infrastructure, journeys, ...Aim of portal is increase ecofriendly bike transport.

Country: (list multiple countries if applicable)

Slovakia

City/Region: (list multiple locations if applicable)

Trnava self governing region

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Creating public interest in ecofriendly transport mode, data are visualised

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Development and deployment of mobile or web applications

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

Region

University of Žilina

What kind of the best practices / case study reference type are you suggesting?

Projects

Which typology of data does the best practice / case study deals with?

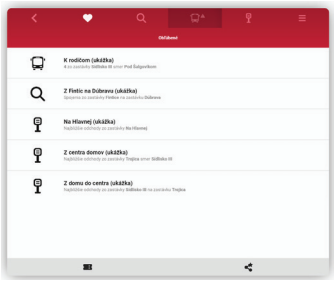
Environment, Water, Energy, Waste, Traffic

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

39. MHDPo



weblink or a DOI:

www.mhdpo.sk

Please provide a brief description or abstract of the proposed best practice / case study reference.

Group or programmers from Nolimit created app based on open data of public transport in Prešov. App is available as webapp and also android/iphone. App makes using public transport comfortable.

Country: (list multiple countries if applicable)

Slovakia

City/Region: (list multiple locations if applicable)

Prešov

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Geoportal became an integral part of the bussiness operation in the KSK. It contributes to capacity building (data literacy, data skills) within and beyond KSK and increase awareness in the are of (open) geospatial data, OSS technologies and data driven policies.

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Modern way to use public transport, city does not need to pay for application, using new technologies

---

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Development and deployment of mobile or web applications

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

City

University of Žilina

What kind of the best practices / case study reference type are you suggesting?

Projects, Dataset

Which typology of data does the best practice / case study deals with?

Traffic

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

40. MoTiV - Dataset of European User Mobility for Behavioral-Data

weblink or a DOI:
https://motivproject.eu/, https://zenodo.org/records/4027465#.YCOZ_-hKguU

Please provide a brief description or abstract of the proposed best practice / case study reference.

Dataset characterizes mobility and value of travel time from different perspectives

Country: (list multiple countries if applicable)

Belgium, Finland, France, Italy, Norway, Portugal, Slovakia, Spain

City/Region: (list multiple locations if applicable)

Any

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Data characterizes mobility behavior and preferences of travellers

---

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Community engagement and participatory approaches, Pilot programs and small-scale trials

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

Region

University of Žilina

What kind of the best practices / case study reference type are you suggesting?

Dataset

Which typology of data does the best practice / case study deals with?

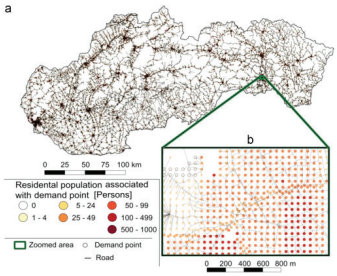
Traffic

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

41. Large-scale test data set for location problems



weblink or a DOI:

https://doi.org/10.1016/j.dib.2018.01.008

Please provide a brief description or abstract of the proposed best practice / case study reference.

The presented data set covers entire area of Slovakia and consists of the graph of the road network and almost 700,000 connected demand points.

Country: (list multiple countries if applicable)

Slovakia

City/Region: (list multiple locations if applicable)

Slovakia

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Data used for optimisation and allocation of service centres (e.g. transfer stations) or transport services (charging infrastructure, road management and maintenance centres, etc.)

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Data characterizes mobility behavior and preferences of travellers

How were the methodologies, studies, pilot programs, and projects implemented in real life?

For localization and optimization tasks (e.g. optimizing the location of charging infrastructure for electromobility)

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

Region

CityOne

What kind of the best practices / case study reference type are you suggesting?

Best practices, Projects

Which topic does the best practice / case study reference pertain to?

Traffic

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

42. smartPORT

weblink or a DOI:

https://www.hamburg-port-authority.de/en/hpa-360/smartport

Please provide a brief description or abstract of the proposed best practice / case study reference.

Project trying to use IoT devices for optimalize logistic costs and transporting goods chain. Focus on intelligent harbour railway, real-time traffic detection using GPS sensors, port monitoring and parking space optimalization.

Country: (list multiple countries if applicable)

Germany

City/Region: (list multiple locations if applicable)

Hamburg

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

The HPA promotes environmentally friendly mobility and is committed to reduced energy consumption. smartPORT energy helps reduce dependence on conventionally generated energy, reduce emissions and save money. The focus is on three core areas: Renewable energies, energy efficiency and mobility.

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Not designed for Open Data. Difficult to find useful data. Limited acces to data.

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Through policy changes and regulations, Introduction of new technologies and infrastructure

For which pilot action do you think this reference source would be applicable?

At which territorial scale was the best practice / case study applied?

City

CityOne

What kind of the best practices / case study reference type are you suggesting?

Best practices, Projects

Which topic does the best practice / case study reference pertain to?

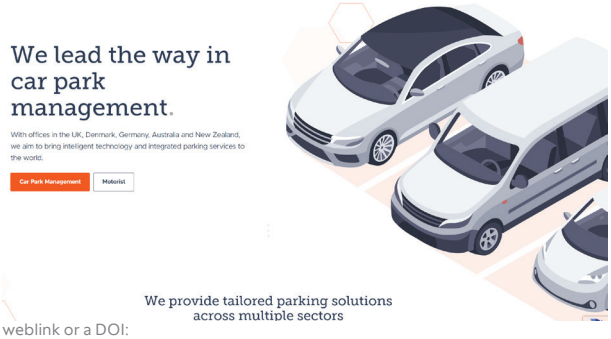
Traffic

Geographic location:

World

What is the name or title of the best practice / case study reference?

43. SmartPark



weblink or a DOI:

https://www.parking.net/parking-industry/smart-parking-ltd

Please provide a brief description or abstract of the proposed best practice / case study reference.

Smart Parking Limited is company with specializating in making smart parking. There main operation areas are UK, Germany, Australia and New Zealand. For smart parking they use Automatic Number Plate Recognition/License Plate Recognition (ANPR/LPR) technology using ANPR camera System. Additionally they offer services like Pay and Walk, Mobile patrols, parking platform for management of parking places.

Country: (list multiple countries if applicable)

UK, Germany, Australia and New Zealand

City/Region: (list multiple locations if applicable)

Westminster, Canberra, Wellington, Cardiff, London, Milton Keynes

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Help to optimize parking in cities using IoT. Decrease car consumption. Increase profit of parking space. Provide long term data from parking for future optimalization.

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

No major complication for this project. Project is under private company and data don't need to be approved to be open.

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Through policy changes and regulations, Introduction of new technologies and infrastructure, Development and deployment of mobile or web applications

For which pilot action do you think this reference source would be applicable?

Debrecen, Nova gorica, Olomouc, Žilina

At which territorial scale was the best practice / case study applied?

City

CityOne

What kind of the best practices / case study reference type are you suggesting?

Best practices, Projects

Which typology of data does the best practice / case study deals with?

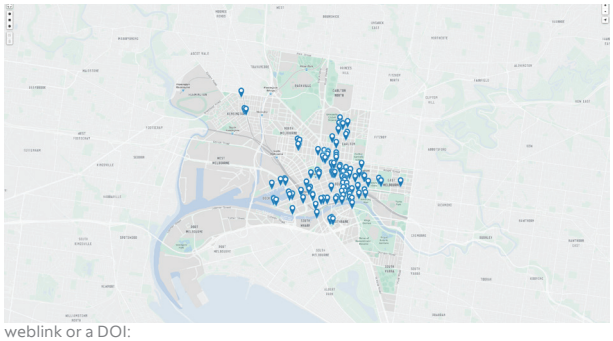
Traffic, Pedestrian Counting

Geographic location:

World

What is the name or title of the best practice / case study reference?

44. Pedestrian Counting System



weblink or a DOI:
https://data.melbourne.vic.gov.au/explore/dataset/pedestrian-counting-system-sensor-locations/information/?location=14,-37.8145,144.98095&basemap=mbs-7a7333

Please provide a brief description or abstract of the proposed best practice / case study reference.

Pedestrian counting system for city of Melbourne was established in 2009. Since then they deploy around 125 sensors around city of Melbourne. Criteria for location: retail and event activity, regular pedestrian use and the egress and entry flow to these areas.

Country: (list multiple countries if applicable)

Australia

City/Region: (list multiple locations if applicable)

Melbourne

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Long term sustainability, since 2009, continuous expanding of the sensor network, ability to compare the trends, larger scale monitoring, very good data portal, could be an inspiration for the content and the layout

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Less trust in data quality, a reference to data that does not work, weak data presentation

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Introduction of new technologies and infrastructure

For which pilot action do you think this reference source would be applicable?

Debrecen, Nova gorica, Olomouc, Žilina

At which territorial scale was the best practice / case study applied?

City

IUAV Venice University

What kind of the best practices / case study reference type are you suggesting?

Journal articles

What is the name or title of the best practice / case study reference?

45. Big and/or open data and transit-served area research


Article preview

Abstract

Section snippets

References (56)

Chapter Twelve - Big and/or open data and transit-served area research

Jiangping Zhou

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Abstract

This chapter looks at how big and/or open data (BOD) can be used to facilitate the transit-served area (T-SA) research and practices. It considers T-SA, or areas within a comfortable walking/biking distance/time (e.g., 800m or 10mins) to a transit station or stop, as consisting of two components: TOD-ness and T-SA performance. TOD-ness measures the extent to which the existing conditions of a T-SA meet (ideal) transit-oriented development (TOD) standards deemed as important by TOD advocates. T-SA performance can be quantified or qualified by indicators or phenomena such as increased transit ridership, improved air quality, neighborhood revitalization, enhanced mobility and environment, public safety, alternative lifestyle, and sense of community. These are the benefits and hopes that people have for performing T-SAs. This chapter revisits what existing studies have informed us concerning T-SAs, TOD-ness, and T-SA performance. It attempts to show how BOD can be used to improve the existing studies. Specifically, it synthesizes what data have been used in the existing studies. It also illustrates how BOD have improved our understanding, and evaluation of T-SAs, in particular, how BOD can be used to (a) formulate indicators measuring TOD-ness and T-

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Which typology of data does the best practice / case study deals with?

Traffic, Transit-Oriented Development; Walkability

Geographic location:

World

weblink or a DOI:

https://doi.org/10.1016/bs.atpp.2020.08.003

Please provide a brief description or abstract of the proposed best practice / case study reference.

This chapter looks at how big and/or open data (BOD) can be used to facilitate the transit-served area (T-SA) research and practices. It considers T-SA, or areas within a comfortable walking/biking distance/time (e.g., 800 m or 10 mins) to a transit station or stop, as consisting of two components: TOD-ness and T-SA performance. TOD-ness measures the extent to which the existing conditions of a T-SA meet (ideal) transit-oriented development (TOD) standards deemed as important by TOD advocates. T-SA performance can be quantified or qualified by indicators or phenomena such as increased transit ridership, improved air quality, neighborhood revitalization, enhanced mobility and environment, public safety, alternative lifestyle, and sense of community. These are the benefits and hopes that people have for performing T-SAs.

Country: (list multiple countries if applicable)

City/Region: (list multiple locations if applicable)

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **No**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

How were the methodologies, studies, pilot programs, and projects implemented in real life?

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

City

CityOne

What kind of the best practices / case study reference type are you suggesting?

Projects

Which typology of data does the best practice / case study deals with?

Waste

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

46. Moda re- (Clothing Bank Collections)

weblink or a DOI:
https://nordsense.com/cases-moda-re-collects-more-and-save-co2/

Please provide a brief description or abstract of the proposed best practice / case study reference.

Moda re- is Spain clothing collector with around +7500 clothinh banks and +125 stores. With help of NordSense they digitize containers with are used for collecting clothes around Spain, with IoT detectors with tracking, how full the contairs is. Additionally containers have tracking device with able to detect if containers is moving with used for on-line check and help against thieves

Country: (list multiple countries if applicable)

Spain

City/Region: (list multiple locations if applicable)

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

With this IoT implementation Re- was able to over 3 mounth periond decrease 5% of carbon emissions and duo to ability to detect when capacity of banks is full. They were able to get more clothing donations, very large scale (all the country, 7,5k sensors)

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Introduction of new technologies and infrastructure

For which pilot action do you think this reference source would be applicable?

At which territorial scale was the best practice / case study applied?

Region

CityOne

What kind of the best practices / case study reference type are you suggesting?

Pilot programs, Projects

Which topic does the best practice / case study reference pertain to?

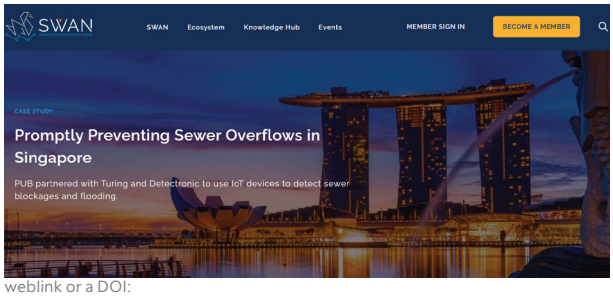
Waste

Geographic location:

World

What is the name or title of the best practice / case study reference?

47. Promptly Preventing Sewer Overflows in Singapore



weblink or a DOI:
https://swan-forum.com/case-studies/promptly-preventing-sewer-over-flows-in-singapore/

Please provide a brief description or abstract of the proposed best practice / case study reference.

Usual case to solve, sewer maintenance and cleaning, 20 LIDoTT sensors have been deployed successfully within the Singapore sewer network. The client has been able to effectively monitor the critical points in network where these sensors have been deployed for hydraulic anomalies, blockages and flooding.

Country: (list multiple countries if applicable)

Singapore

City/Region: (list multiple locations if applicable)

Singapore

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Effectively monitoring the critical points in network where these sensors have been deployed for hydraulic anomalies, blockages and flooding. Greatly improving their abilities of reducing public and environmental impact. Over a twelve-month period from Jan 2021 to Dec 2021, PUB has been alerted to 10 events within the wastewater network, which were promptly cleared before any overflow events occurred.

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

The project is divided into many phases. Project finished phase 1 with 20 sensors and it will be followed by phase 2 with 200 sensors. Main goal of the project is to implement around 2,000 sensors. No design for open data.

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Introduction of new technologies and infrastructure, Pilot programs and small-scale trials

For which pilot action do you think this reference source would be applicable?

At which territorial scale was the best practice / case study applied?

City

CityOne

What kind of the best practices / case study reference type are you suggesting?

Pilot programs

Which topic does the best practice / case study reference pertain to?

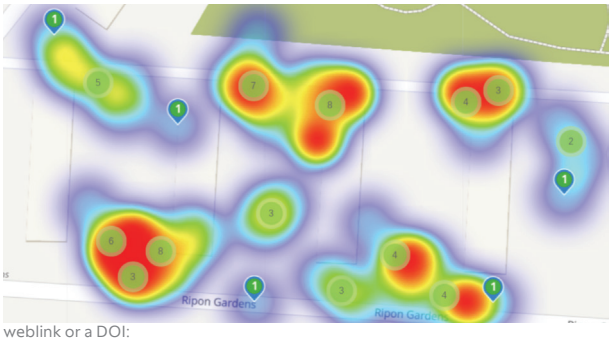
Waste

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

48. Fly Tipping IoT Case Study



weblink or a DOI:
https://docs.google.com/document/d/1hSWBKE7841pjDVbTncRzQL4ih0FuVW-fzWfK17dqSNLU/edit#heading=h.ghucmq6jsduo

Please provide a brief description or abstract of the proposed best practice / case study reference.

Pilot focus was about illegal dumping in an area of London (Sutton). For figthing this problem the authorities created a test pilot for detecting fly tipping using camera system with machine learning detection of garbage. They choose two testing areas Kingstom and Sutton. In Kingstom there were 10 hotspot areas and 20 sensors installed. For area of Sutton 12+21 hotspot areas with 29 sensors.

Country: (list multiple countries if applicable)

UK

City/Region: (list multiple locations if applicable)

London

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Big success was achieved in Kingston. The sensors have been an effective deterrent for fly-tippers and activity has decreased. Councillors and residents have been very supportive of this effort. There was movement keep system in place even after ending period (December 2022). Generation of illegal dumping was reduced around 80% in Kingston.

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Process of learning takes around 6-8 weeks. Trial in Sutton was unsuccessful due bad hardware components and problem with repairs. Council of Sutton decided that project is cost inefficient and didn't extend the trial period. No open data.

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Through policy changes and regulations, Community engagement and participatory approaches, Pilot programs and small-scale trials

For which pilot action do you think this reference source would be applicable?

At which territorial scale was the best practice / case study applied?

City

CityOne

What kind of the best practices / case study reference type are you suggesting?

Projects

Which typology of data does the best practice / case study deals with?

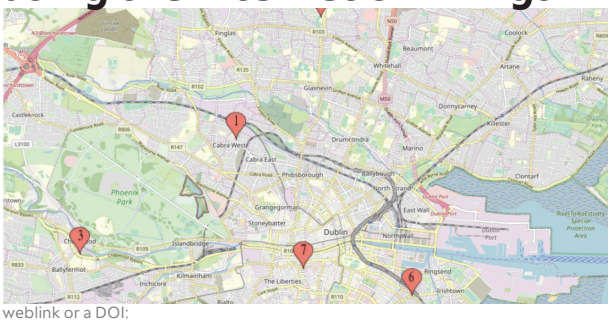
Water

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

49. River and Rainfall Monitoring using the Internet of Things



weblink or a DOI:
https://publications.scss.tcd.ie/theses/diss/2019/TCD-SCSS-DISSERTATION-2019-023.pdf

Please provide a brief description or abstract of the proposed best practice / case study reference.

Study on rainfall sensors quality as well as the layout within the city, flood and rain monitoring combination, good example of how wise a city should be to operate reliable sources of data

Country: (list multiple countries if applicable)

Ireland

City/Region: (list multiple locations if applicable)

Dublin

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Through policy changes and regulations, Introduction of new technologies and infrastructure

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

City

CityOne

What kind of the best practices / case study reference type are you suggesting?

Projects

Which typology of data does the best practice / case study deals with?

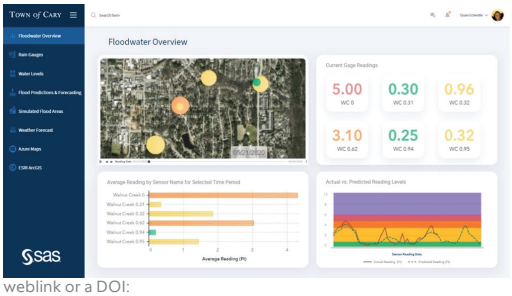
Water

Geographic location:

World

What is the name or title of the best practice / case study reference?

50. Town of Cary innovates flood prediction with IoT



weblink or a DOI:
https://azure.microsoft.com/en-us/blog/town-of-cary-innovates-flood-prediction-with-iot/

Please provide a brief description or abstract of the proposed best practice / case study reference.

Example of a use case with data visualisation and automatic informing of the staff, long term monitoring of floods

Country: (list multiple countries if applicable)

USA

City/Region: (list multiple locations if applicable)

Cary

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Regional aspect

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Missing open data

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Introduction of new technologies and infrastructure, Pilot programs and small-scale trials

For which pilot action do you think this reference source would be applicable?

Vicenza

At which territorial scale was the best practice / case study applied?

City

DKV Debrecen Exclusive Public

What kind of the best practices / case study reference type are you suggesting?

Best practices, Projects

Which typology of data does the best practice / case study deals with?

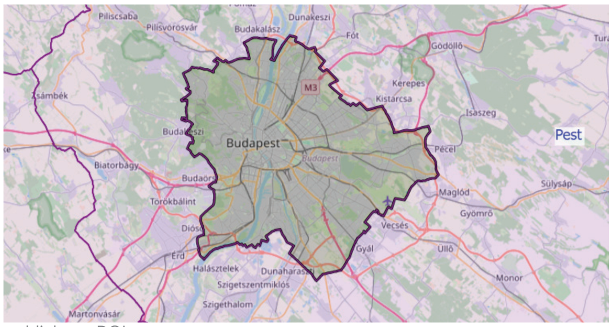
Water

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

51. Hungarian Water Open Data



weblink or a DOI:

https://data.vizugy.hu/

Please provide a brief description or abstract of the proposed best practice / case study reference.

The proposed best practice or case study references on the Hungarian National Water Directorate's open data platform would typically focus on water management, flood risk assessment, hydrological monitoring, and environmental protection. The platform could support the implementation of advanced technologies in water data management. They offer insights into efficient resource management and environmental sustainability within Hungary's water systems.

Country: (list multiple countries if applicable)

Hungary

City/Region: (list multiple locations if applicable)

Hungary

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **No**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

The platform needs to be more user-friendly as it could be quite tricky to find, gather and obtain data from the portal in its current state.

How were the methodologies, studies, pilot programs, and projects implemented in real life?

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

Region

CityOne

What kind of the best practices / case study reference type are you suggesting?

Pilot programs

What is the name or title of the best practice / case study reference?

52. Valencia

Which topic does the best practice / case study reference pertain to?

Water

Geographic location:

Europe

weblink or a DOI:
https://www.gsma.com/solutions-and-impact/technologies/internet-of-things/wp-content/uploads/2017/10/iot_omnium_10_17.pdf

Please provide a brief description or abstract of the proposed best practice / case study reference.

Valencia has created a pilot when they use new model of water meter with NB-IoT. they have been conducting a trial with around 220 meters from a range of six different manufacturers to assess the properties, performance and battery life.

Country: (list multiple countries if applicable)

Spain

City/Region: (list multiple locations if applicable)

Valencia

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Test was succesful. They achieved their goal with 24 readings per day. On top of that possible reading was around 500 messages per day with overcome required conditions. Water meter operation lifetime is around 10 years.

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Project dind't encountered any major complication. No open data. Need cooperation from public and private sector.

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Through policy changes and regulations, Development and deployment of mobile or web applications, Pilot programs and small-scale trials

For which pilot action do you think this reference source would be applicable?

At which territorial scale was the best practice / case study applied?

City, Region

CityOne

What kind of the best practices / case study reference type are you suggesting?

Projects

Which topic does the best practice / case study reference pertain to?

Water

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

53. Gandia

weblink or a DOI:
https://www.idrica.com/wp-content/uploads/2020/07/202007-EN-Case-Study-The-digital-transformation-of-water-.pdf

Please provide a brief description or abstract of the proposed best practice / case study reference.

Gandia implemented around 40,000 smart meters with NB-IoT sim cards. In the next phase they will create a platform for a centralized management.

Country: (list multiple countries if applicable)

Spain

City/Region: (list multiple locations if applicable)

Gandia

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

(+250) leaks detected per year in the supply network, 60 serious leaks detected per month, 150 average leaks detected per month and 0.5hm3 water savings per year

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Hard to find information about improvement. Data needs an approved to be used as open data. Not designed for open data

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Through policy changes and regulations, Development and deployment of mobile or web applications, Community engagement and participatory approaches

For which pilot action do you think this reference source would be applicable?

At which territorial scale was the best practice / case study applied?

City, Region

CityOne

What kind of the best practices / case study reference type are you suggesting?

Best practices, Projects

Which topic does the best practice / case study reference pertain to?

Water

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

54. Damp and Mould IoT Case Study

weblink or a DOI:
https://docs.google.com/document/d/1sqNSSQZ6Btm2feWv0-F41FgIvT0S7Ksjt-DQ16T0OnGs/edit#heading=h.ghucmq6jsduo

Please provide a brief description or abstract of the proposed best practice / case study reference.

Main focus of project to study generation of damp and mould inside of houses. For that they installed temperature and humidity sensors in multiple buildings.

Country: (list multiple countries if applicable)

UK

City/Region: (list multiple locations if applicable)

London

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

“Easy installation. Up to 30% of residents who had these sensors were identified as potentially suffering from fuel poverty, enabling advice and support to be provided. Properties where the humidity was identified as exceptionally high, were also sent information to help prevent condensation and the growth of damp and mould.The sensors were able to identify whether a resident had been using their heating or not, therefore impacting the likelihood of damp and mould in the property. It was observed that a void property can create a fridge-like effect around other properties “

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Need to be allowed by landlords. No platform for open data; a need to be approved for providing this information to public (open data)

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Introduction of new technologies and infrastructure, Community engagement and participatory approaches

For which pilot action do you think this reference source would be applicable?

Olomouc

At which territorial scale was the best practice / case study applied?

City, Region

CityOne

What is the name or title of the best practice / case study reference?

55. City of Cape Town's Water Map

What kind of the best practices / case study reference type are you suggesting?

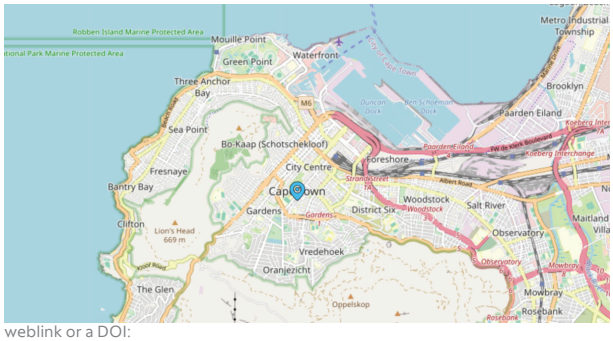
Best practices, Projects

Which topic does the best practice / case study reference pertain to?

Water

Geographic location:

World



weblink or a DOI:
https://use.metropolis.org/case-studies/city-of-cape-towns-water-map#case-studydetail

Please provide a brief description or abstract of the proposed best practice / case study reference.

City of Cape Town created an online map, where they show usage of water for each house with data readings. Range of data information has been collected in period 2015-2018 and website has been published in 2018. They use GIS map when every house has a point with a distinction of whether they use less or more then 6 000 litres per month.

Country: (list multiple countries if applicable)

South Africa

City/Region: (list multiple locations if applicable)

Cape Town

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

The map was first published in January 2018, and after the first media reports the website experienced some of the highest Internet traffic ever by a City of Cape Town webpage. Residential water use dropped considerably and Cape Townâ€™s overall water use declined by 55% from pre-drought levels.

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

“Project duration was 2015-2018. It is not informed if the readings are automated using IoT. Website with map doesn’t exist anymore. “

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Through policy changes and regulations, Development and deployment of mobile or web applications, Community engagement and participatory approaches

For which pilot action do you think this reference source would be applicable?

At which territorial scale was the best practice / case study applied?

City

CityOne

What kind of the best practices / case study reference type are you suggesting?

Projects

Which topic does the best practice / case study reference pertain to?

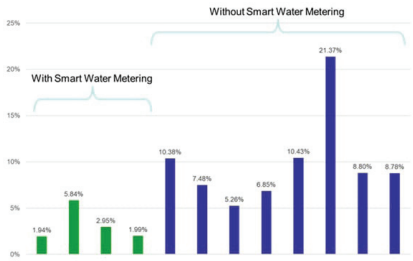
Water

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

56. Embracing IoT & Smart Metering For A Water Resilient Barcelona



weblink or a DOI:

https://utilitymagazine.com.au/success-story-suez-iot-barcelona/

Please provide a brief description or abstract of the proposed best practice / case study reference.

Barcelona goal was to eliminate the 9 million manual reading operations required every year. Project established around one million smart meters in 23 cities.

Country: (list multiple countries if applicable)

Spain

City/Region: (list multiple locations if applicable)

Barcelona

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Reducing operating costs and fraud thanks to smart data, Reducing bills for the end users, Providing access to real-time data via an online portal

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Project didn't have any major problem. No public data information and it is only used by water company and customer. Projects would need to have a permission for use of water data to public domain (open data)

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Through policy changes and regulations, Introduction of new technologies and infrastructure

For which pilot action do you think this reference source would be applicable?

At which territorial scale was the best practice / case study applied?

City, Region

CityOne

What kind of the best practices / case study reference type are you suggesting?

Projects

Which topic does the best practice / case study reference pertain to?

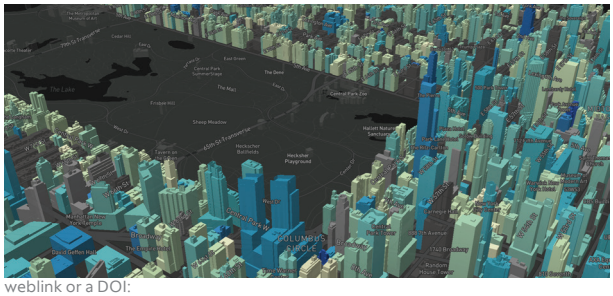
Water, Energy

Geographic location:

World

What is the name or title of the best practice / case study reference?

57. NYC Energy & Water Performance Map



weblink or a DOI:

https://energy.cusp.nyu.edu/#/

Please provide a brief description or abstract of the proposed best practice / case study reference.

Covering twelve years of data, the NYC Energy & Water Performance Map provides an interactive data analysis and query platform to better understand the energy and water efficiency and carbon emissions intensity of almost 30,000 of the largest buildings across New Yorkâ€™s five boroughs.

Country: (list multiple countries if applicable)

USA

City/Region: (list multiple locations if applicable)

New York

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Map is used for informing public and administration of energy and water consumption of city of New York

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Data only to 2022. It is not sepcified if the data was colleted by IoT. Duo to law only building with specific size are required to provide the report about energy and water consumption (Private buildings 4,645 m2 (50,000 ft2) and public sector 929 m2 (10,000 ft2))

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Through policy changes and regulations, Community engagement and participatory approaches

For which pilot action do you think this reference source would be applicable?

At which territorial scale was the best practice / case study applied?

City

CityOne

What kind of the best practices / case study reference type are you suggesting?

Best practices, Projects

Which topic does the best practice / case study reference pertain to?

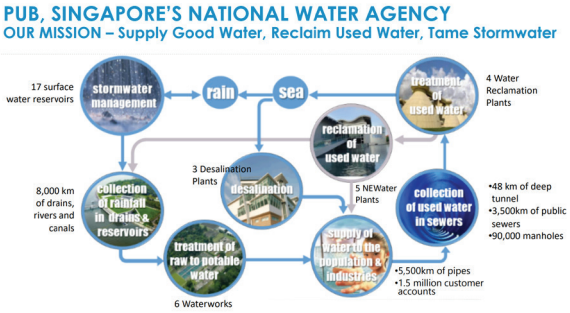
Water, Waste

Geographic location:

World

What is the name or title of the best practice / case study reference?

58. SMART PUB



weblink or a DOI:

https://events.development.asia/system/files/materials/2020/11/202011-smart-water-management-singapore-experience.pdf

Please provide a brief description or abstract of the proposed best practice / case study reference.

Goal of projet of SMART PUB is to smart water management. The plan is to implement smart drainage grid, smart plants, smart water grid and smart sewer grid with use of IoT, autonomous systems, AI and data analytics. Project created 5-year plan to deploy this smart system. So far they instaled 300 sensors for water quality, 600 flow and water level sensors for dranage grid and lastly 700 level, flow and water quality for sewer grid

Country: (list multiple countries if applicable)

Singapore

City/Region: (list multiple locations if applicable)

Singapore

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Increase operation efficiency and increase safety and security.

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

No open data platform, project is still on-going

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Through policy changes and regulations, Introduction of new technologies and infrastructure

For which pilot action do you think this reference source would be applicable?

At which territorial scale was the best practice / case study applied?

City, Region

CityOne

What kind of the best practices / case study reference type are you suggesting?

Pilot programs, Projects

Which typology of data does the best practice / case study deals with?

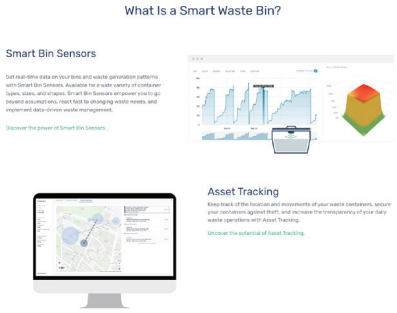
Waste

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

59. Eliminating Overflowing



weblink or a DOI:

https://nordsense.com/cases-madrid/

Please provide a brief description or abstract of the proposed best practice / case study reference.

City of Madrid duo increase of population and exponencialy increasing waste generation. City of Madrid created IoT project with intention to decrease effect of waste generation. With help of NordSense with provide sensors, they establish 250 smart bins. This bins are used for collecting paper and cardboards.

Country: (list multiple countries if applicable)

Spain

City/Region: (list multiple locations if applicable)

Madrid

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **Yes**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

With this IoT implementation and additional research this project was able to find optimalization of collecting bins. They find out that 46% of paper and cardboard bins are overflowing when serviced. Around 26 % bins was collented too early. With this IoT implementation it was calculated that if City of Madrid implement 10,000 of smart bins they can decrease numbers of collection services by 11,880 every month

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Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Introduction of new technologies and infrastructure, Pilot programs and small-scale trials

For which pilot action do you think this reference source would be applicable?

At which territorial scale was the best practice / case study applied?

City

IUAV Venice University

What kind of the best practices / case study reference type are you suggesting?

Pilot programs, Repository

What is the name or title of the best practice / case study reference?

60. Iuav Open Data

Which typology of data does the best practice / case study deals with?

Geographic location:

World

weblink or a DOI:

http://opendata.iuav.it/en/

Please provide a brief description or abstract of the proposed best practice / case study reference.

The website originally intended to gather open data from several sources in order to provide a easy-to-use, comprehensive tool to the Iuav community and the public

Country: (list multiple countries if applicable)

City/Region: (list multiple locations if applicable)

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **No**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

Lack of update

How were the methodologies, studies, pilot programs, and projects implemented in real life?

Development and deployment of mobile or web applications

For which pilot action do you think this reference source would be applicable?

At which territorial scale was the best practice / case study applied?

City, Region

IUAV Venice University

What kind of the best practices / case study reference type are you suggesting?

Best practices, Studies, Projects

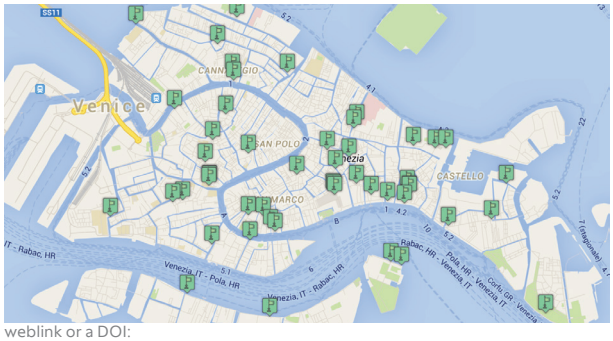
Which typology of data does the best practice / case study deals with?

Geographic location:

Europe

What is the name or title of the best practice / case study reference?

61. VE14Open



weblink or a DOI:
https://sites.google.com/site/ve14open/executive-summary?authuser=0

Please provide a brief description or abstract of the proposed best practice / case study reference.

Country: (list multiple countries if applicable)

Italy

City/Region: (list multiple locations if applicable)

Venice

Were the practices, methodologies, studies, pilot programs, and projects implemented in real life? **No**

Which positive outcomes or successes were observed from the implementation of these practices, methodologies, studies, pilot programs, or projects?

Please see executive summary

Which challenges or negative outcomes were encountered during the implementation of these practices, methodologies, studies, pilot programs, or projects?

How were the methodologies, studies, pilot programs, and projects implemented in real life?

For which pilot action do you think this reference source would be applicable?

All of them

At which territorial scale was the best practice / case study applied?

City