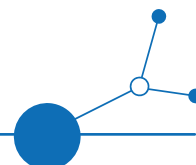


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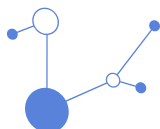
EnCLOD territories Open Data maturity level and gaps analysis



Version 1.0

10 2024





EnCLOD

Enhancing governance Capacities of Local authorities using Open Data

WP 1	Open Data for city-region planners
Activity 1.2	Setting the scene: Open Data maturity and gaps analysis in Pilot Areas
Deliverable 1.2.1	EnCLOD territories Open Data maturity level and gaps analysis
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Disclaimer

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A. Introduction

The Deliverable 1.2.1 of the Project EnCLOD lays the foundations for the development of the whole project activities, by performing a thorough survey of the Open Data (OD) usage in the five Pilot Areas (Vicenza, Debrecen, Olomouc, Nova Gorica, Žilina) and describing the state-of-the-art of OD advancement in these territories.

To this end, a Questionnaire was prepared by the activity coordinator (P06, CityOne), supported by the Lead Partner (Province of Vicenza), and submitted online to the whole Partnership, which described the state of Open Data usage in their Pilot Areas. The results of the questionnaire are summarized in this Deliverable: the Partners described the *Institutional framework of Open Data* in their territory, the existing *OD providers and IT tools*, the *OD use cases* which can be observed, finally providing a *OD maturity assessment* at the local/regional level. All in all, an exhaustive and synthetic picture of the Open Data usage for the Pilot Areas was produced through this process.

The activity coordinator (P06) then reviewed the results of the survey, putting to use the technical expertise gained in previous cooperation projects and in its private company work, eventually drawing the *Summary* which can be found at the beginning of each paragraph. All the Summaries were used for the elaboration of the following *Comparison and gaps analysis*, conducted between the five project territories and in relation with an international Best Practice, Barcelona, renowned for its advanced initiatives, as *Open Data BCN* and *Barcelona Digital City*.

The result, as shown in the *Conclusions* of the Deliverable, is an extensive and diversified picture of the Open Data development in five territories throughout the area of Interreg Central Europe, which outlines the potential for further advancement in the use of OD for territorial government by local authorities. This Deliverable will therefore provide the basis for the following steps of the Project EnCLOD, particularly the preliminary guidelines for Open Data usage by city-region planners (Activity 1.3) and the Local Action plans (Activity 1.4), in this way ensuring to harness the Pilot Areas potential for use of Open Data and to achieve a relevant territorial impact.



B. Open Data maturity level in the Province of Vicenza

1. Institutional framework of Open Data

Key insights:

- Open data agenda on national level is well defined, instructionally settled and develops quite well. At the Province level, there is a geoportal mainly for urban planning and environment monitoring.
- Open data is mainly static, IoT open data are used only for meteo stations, otherwise they represent a new way of thinking.

The diffusion of Open data was prompted in the Province of Vicenza, as in other parts of the Venetian Region, between 2005 and 2015 after the Italian Government passed a national decree called “Code of the digital administration” (Decree n.82 of 2005), which prompted the diffusion of data from public authorities in open formats to be reused by the civil society (on the basis of the European Directive 2003/98/EC). This national decree was later adopted by the Government of Venetian Region (Regione Veneto) through a Regional Law approved in 2008 and called “Regulations on pluralism of information, diffusion of reuse and adoption of open formats for digital documents in the information society of Veneto” (Regional Law n.19 of 2008), which makes the national orientation its own supporting the sharing of data between public authorities and citizens.

These regulations focus on the adoption of open standards by the Public Administrations for their data: their objectives were, as stated in the Regional Law, **“to promote participation in democratic life and fruition of public services by citizens and companies, to remove technological barriers that hinder the diffusion of knowledge and innovation”**. These regulations came to have an important impact on the availability of Open Data in the Province of Vicenza: they concretely promoted the diffusion of digital format for data of public authorities and their open publication online (which was before very limited). Many Municipalities have since started to digitalize their documents and to publish yearly open datasets online, even if these advancements do not concern the totality of the municipal authorities because such regulations are not cogent. The Province of Vicenza itself started to provide data to the public through its “Geoportal”, which makes available geographic data concerning territorial planning and environmental monitoring projects.

2. Open Data providers and tools

Key insights:

- The open data culture is developing, the broader cooperation among the national level, regional and local level is still a challenge, no supportive program on national level settled
- Silo based thinking still at place, no national strategy on IoT data collection in the public space
- Private open data integration is still not the issue
- The majority of open data is static, no technical standard for open IoT/dynamic data



- Environment data and water data are provided real time by Regional Environmental Agency of Veneto and can be examined regarding the data standard as well as the apps/tools/SW profiting from the data availability

The Open Data main providers for the territory of Vicenza are the Regional Environmental Agency of Veneto (ARPAV) and the Regional Government of Veneto (Regione Veneto), an important provider is also the Province of Vicenza itself. The Regional Environmental Agency of Veneto provides data concerning Environment (air pollution, soil pollution, etc.), Water management and pollution, Waste collection and disposal. The Regional Government of Veneto provides data concerning Transports (number of vehicles, etc.), Energy and others topics of general interest (population, tourism, education). The Province of Vicenza provides data concerning territorial planning and data from specific environmental monitoring projects.

The most exhaustive tool for the collection and consultation of Open Data is the web portal “Open Data Veneto”, which was established by the Regional Government of Veneto in 2011 to collect and make available the data from public authorities (see dati.veneto.it). This portal, fully operational as of 2024, collects currently 5.463 open datasets: there are 1.589 datasets for the territory of Vicenza provided from 67 Municipalities (on a total of 114 Municipalities in the area); moreover the portal contains 110 datasets from the Regional Environmental Agency and 114 datasets from the Regional Government which contains information on Vicenza area. The quality and update of these datasets varies greatly: the data from the Environmental Agency are high-resolution ones, while the data from Municipalities are often low-resolution or quantitative ones; the data are generally updated yearly, making them useful for long-span studies but not for detailed analysis.

Furthermore, the data from the Regional Environmental Agency (ARPAV) are made publicly available on their web portal and geoportal (www.arpa.veneto.it; gaia.arpa.veneto.it): from these tools can be extracted **high-quality data from the meteo and water stations of the Environmental Agency, which are dynamically updated, many on a hourly or daily base** (meteorological data hourly, water data daily). The website of the Environmental Agency contains a further specific section for Open Data, which provides environmental monitoring and sensitive data on waste, industrial production, air and water pollution. Generally the data provided by the Agency are of high quality, even if spread through different websites and portals.

Finally, the data from the Province of Vicenza are made publicly available on their geoportal (geoportale.provincia.vicenza.it), which provides geographical data. The datasets included on the geoportal concern in particular territorial planning, from the last planning documents elaborated by the Province. Other data concerns environmental monitoring data collected by specific projects through the years (for monitoring of water availability and pollution, biodiversity, air pollution). The data on the geoportal are static and date back to a period going from 2010 to 2022.

3. Open Data use cases

Key insights:

- Open data collection support is mainly assured by European projects and local community organized by Digital innovation hub of Vicenza and Foundation for university studies; Vicenza is moderately strong in the community and can provide further info for the project partners Local action plans.
- There are guidelines for open data interoperability, a set of tools to support the use of open data and new products and services on the topics of mobility, environment and tourism developed by a European project; Vicenza can share good practice with the project partners.
- The relevant topics for EnCLOD project are urban development, mobility, and tourism



- Vicenza is to work out a more detailed description of the outputs of the past hackathons to identify the existing data sources, use cases and products
- The key open data for data driven urban development besides IoT, selected by Vicenza, are meteo stations readings (with rain, solar radiation), satellites readings, traffic counts and drones and thermo-cameras used by public authorities

While the Open Data available for the Province of Vicenza are a relevant amount (albeit of varying quality), the number of use cases for this territory is small. From 2010 to 2022 a limited number of experiences carried out by European projects and hackathons have put to use the available Open Data and can be examined here:

The European Project “Homer” (Interreg MED Programme, 2011-2014) examined the differences between digital data standard in the partner regions of Spain, Italy, France, Malta, Greece, Slovenia, Cyprus and Montenegro, **developing guidelines for open data interoperability**, in coherence with European Directive PSI (2003/98/EC). The project organized a hackathon called “Hack4med” which involved SMEs in the IT sector for the reuse of Open Data and whose awards were given in Turin in 2014 ([hack4med-for-homer-eu-project](#)).

The European Project “Odeon” (Interreg MED Programme, 2018-2020) supported the empowerment of SMEs and clusters related to the Smart Specialization Strategy (S3) through the use of the available Open Data for the development of IT app and tools. The project worked to create **groups of stakeholders** from the IT ecosystem (called “Data Hub”) in each partner region able to exploit and valorise the existing OD resources for local development.

The European Project “DEAS” (Interreg Alpine Space Programme, 2019-2022) aimed at exploiting open data to promote the development of **new products and services on the topics of mobility, environment and tourism**, using APIs that allow direct interaction with open data providers in the territorial area where the projects takes place. DEAS produced **a set of tools to support the use of Open Data**, such as training contents and a toolkit, which are available on its website ([opendataveneto.regione.veneto.it/progetto-deas](#)).

With regard to hackathons, while there currently no initiatives held regularly in the area of Vicenza, from 2018 to 2022 a number of interesting experiences were organized by the **Digital Innovation Hub of Vicenza** ([digitalinnovationhubvicenza.it/hackathons](#)). The hackathons held in these years were: in 2018 the NASA Space App Challenge (with 26 teams and 200 participants, to develop applications oriented to use in space navigation); in 2020 the **Copernicus Hackathon (to promote the use of Copernicus data and IOT technologies to benefit SMEs and public authorities)**, in 2021 VI Challenge Hackathon I and in 2022 VI Challenge Hackathon II (oriented to gender issues, circular economy and accessible culture). All these hackathons were organized in collaboration with the **Foundation for University Studies**, which provided the location and the monetary prizes. These activities organized by the Digital Innovation Hub of Vicenza, as well as the participation of the regional Google Developer Group ([gdg.community.dev/gdg-vicenza](#)) point out **potential actors for the development of future activities**.

As a benchmark for the IT advancement of the Province of Vicenza, it can be considered the existence of meteo stations readings (with rain and solar radiation measurement) available to the public as Open Data, of traffic counts available to the public as Open Data and of measuring devices (drones, thermocameras) used by the public administrations.

4. Open Data maturity assessment

Key insights:

- Data availability can be evaluated at moderate level



- Data quality on moderate-high level
- Data use is growing so on emerging level
- Governance established (portal, staff, strategy, events)
- Impact is low to some

From 2005 an increasing availability of Open Data coming from the public authorities can be observed in the Province of Vicenza, as in the whole Veneto Region, regarding topics as environment, transports and planning: the related National and Regional laws (2005, 2008) encouraged many Municipalities to publish datasets in open format, and other authorities as the Regional Environmental Agency, the Regional Government and the Provincial Government followed this path making available their information online.

The quality and the update period for these open datasets is nonetheless very diversified: dynamic and high-quality data are provided only by the Environmental Agency for a selected number of topics (meteorology, air pollution), some high-quality information have a longer update period, while the majority of open data coming from the Public Administrations are still low quality and updated yearly, useful for statistical series but not for continuous monitoring and analysis.

Furthermore, even if the number of available Open Datasets is significant, our survey showed that their usage is still occasional in the Province of Vicenza, both by the research institutions and by the companies of the private sector. This can be due, on the one hand, to the low quality and long upgrade period of many open datasets, on the other hand to the lack of visibility of the Open Data to the regional audience and to the lack of IT tools that allow an easy access to the data, appealing the citizens to approach and consider the available information.

Open Data emerges therefore at the moment as a significant potential for the Province of Vicenza, due to the large amount of “raw data” that are currently available. But to increase the diffusion of their use, both for society and government issues, it will be necessary to confront such issues as the quality of datasets and their accessibility for a larger audience, to make open data increasingly a commodity for the citizens.

Dimension	Initial	Emerging	Established	Leading
Data Availability	Limited	Moderate	Broad	Comprehensive
Data Quality	Low	Moderate	High	Excellent
Data Use	Minimal	Growing	Active	Highly Active
Governance	Informal	Initial	Formal	Advanced
Impact	Low	Some	Clear	Significant



C. Open Data maturity level in the City of Debrecen

1. Institutional framework of Open Data

Key insights:

- Open data agenda on national level is well defined, instructionally settled and develops quite well.
- Open data is mainly static, IoT open data is totally new way of thinking.

Source:

https://www.parlament.hu/documents/10181/39233854/Infojegyzet_2021_44_kozadatok_piaci_ujrahasznositasi.pdf/7b09cdcd-3272-0909-2173-0f194e8b5a63?t=1622619138475

Hungary has taken gradual steps to be aligned with the current EU regulations on open data and at the same time Hungary had a gradual realization on how valuable open data can be for economic growth. The EU legislation (2019/1024/EU: <https://eur-lex.europa.eu/legal-content/HU/TXT/?uri=CELEX:32019L1024>) wanted to further help businesses operating in the field of public data recycling by making the so-called access to large pools of value. This includes geospatial, remote sensing, meteorological, statistical, company registration and traffic public data, which is why they are of great value because, according to experience, they have great commercial potential. Transport further broadened the range of reusable public data, which includes transport and utility companies that have been involved since then, as well as data from research published with public funds. The above-mentioned legislation's policies have been implemented in the XCI. of 2021. law of Hungary: <https://njt.hu/jogszabaly/2021-91-00-00>

2. Open Data providers and tools

Key insights:

- No open data provided, no specific supportive programmes running
- Silo based thinking still at place, no national strategy on IoT data collection in the public space
- Private open data integration is still not the issue
- no technical standard for open IoT/dynamic data

In Debrecen, Hungary, the municipality owned Debrecen Asset Management holding company oversees the operations of member companies that are responsible for tasks that support the public, including water and waste. Holding company: Debreceni Vagyonkezelő Zrt. (<https://www.dvrt.hu/>)

1, Water: Debreceni Vízmű Zrt. (<https://www.debreceni-vizmu.hu/>)

2, Energy: Debreceni Hőszolgáltató Zrt. (<http://www.dhrt.hu>)

3, Transport: DKV Debreceni Közlekedési Zrt. (<http://www.dkv.hu>)

Municipality owned but not under the holding company:

4, Waste: AKSD Kft. (<https://www.aksd.hu/>)



5, Environment and other relevant urban operations: Debreceni Városüzemeltető Kft. (<https://dvv.hu/>)

No data published by any of the companies. No specific programmes have been found in Debrecen or its region.

National initiatives:

1, Nemzeti Infokommunikációs Szolgáltató Zrt. (National Infocommunications Services Inc.), <https://www.kozadattar.hu/>, had an initiative to support the access to open data in Hungary and promote Open Data developments. However, the portal seems obsolete now.

2, An in-operation portal is the National Public Data Portal, operated by the Nemzeti Adatvagyon Ügynökség (National Data Assets Agency): <https://kozadatportal.hu/>.

The National Public Data Portal provides an interface for those interested in public data, as well as for persons and organizations initiating the further use of data belonging to the national data assets, through which the metadata of the bodies handling the data are published in a uniform, structured form, in a machine searchable manner. Information on the further use of data belonging to the national data assets can be found, as well as data utilization support services can be used. Apart from offering a platform for search for data, it offers a knowledge base but that only forwards the user to European data portal: <https://data.europa.eu/hu/academy>.

3. Open Data use cases

Key insights:

- no agenda, no hackathons, just joined for the Climathon

No regularly held hackathons have been found in our Pilot Area.

No hackathons have been found that would be similar to the ones tackled by project EnCLOD, but the Municipality did join international initiatives like the Climathon (<https://climathon.climate-kic.org/>) hackathon on multiple occasions.

4. Open Data maturity assessment

Key insights:

- Data availability can be evaluated at moderate level
- Data quality on moderate-high level
- Data use is growing so on emerging level
- Governance established (portal, staff, strategy, events)
- Impact is low to some
-
- Action plan should start the activities, twinning is very important, Debrecen represents a partner who should start building open data strategy from the scratch.
- Training materials could be tested on Debrecen
- It can be expected that the Action plan of Debrecen will be completed much later than the others'.

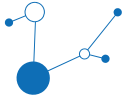


Based on our judgement, Open Data in the city of Debrecen and its region definitely has a lot of room for improvement. Currently, the options to access Open Data in Debrecen is very limited, especially if someone is looking for certain kinds of datasets to use for software development or other kind of purposes. The entities that possess data have not yet reached a state that they would have been provided the data for the public.

Low - Open data are used only for a few topics (environment, etc.)

Very low - some organizations and/or some open data sets are published on city/region open data portal

Dimension	Initial	Emerging	Established	Leading
Data Availability	Limited	Moderate	Broad	Comprehensive
Data Quality	Low	Moderate	High	Excellent
Data Use	Minimal	Growing	Active	Highly Active
Governance	Informal	Initial	Formal	Advanced
Impact	Low	Some	Clear	Significant



D. Open Data maturity level in the City of Olomouc

1. Institutional framework of Open Data

Key insights:

- Open data agenda on national level is well defined, instructionally settled and develops quite well. At the state level, there is an institution (The Digital and Information Agency) as well as a national coordinator covering open data activities.
- Open data is mainly static, IoT open data is totally new way of thinking, with big potential to boost.
- UPOL is a very advanced partner for the pilot area having real experience with open data concept, local data knowledge, its application and hackathons organization and is also a methodological partner for the city as well as the region.

In Czech legislation, the issue of open data is anchored in Act No. 106/1999 Coll., on free access to information, which deals with the obligations of state entities to provide information, the rights of free access to this information and the rules for providing it. For the purpose of this Act, the obligation to provide information is incumbent on state bodies, bodies of territorial self-government units (regions and municipalities) and public institutions, either on the basis of a request or by publication. In the case of provision of information on the basis of a request, the information shall be provided in the formats and languages requested in the request, or in the original formats and languages if the translation would be too complex for the provider. Where information is provided by electronic publication, it shall be retained in the original formats and languages, but at least one of the formats in which the information is published must be open. In both cases, metadata should be provided along with the data, in accordance with established standards. The latter uses open data, which the law defines as 'information published in a way that allows remote access in an open and machine-readable format, which is not restricted in its manner or purpose of subsequent use and which is recorded in a national open data catalogue'. In the Olomouc Region there is also the methodological framework (Concept of the Open Data Portal of the Olomouc Region), which was created by Palacký University in Olomouc. According to this document, the open data portal of the region has been created this year.

2. Open Data providers and tools

Key insights:

- The open data culture is developing, the broader cooperation among the national level, regional and local level is still a challenge, no supportive program on national level settled
- Silo based thinking still at place, no national strategy on IoT data collection in the public space
- Private open data integration is still not the issue
- The majority of open data is static, no technical standard for open IoT/dynamic data
- UPOL can share the result and the process of creating a regional strategy on open data with the project partners and prepare an Internal training session for the project partners.



At the national level, there are several government institutions dealing with data in these areas (in particular Environment and Water). These data are mainly published at national level due to their importance and type. The data are provided for the whole territory of the Czech Republic and then it is possible to select from them at regional and municipal level. These institutions publish open data on their portals and in their local catalogues and the data are further linked to the National Catalogue of Open Data where they are available without any restrictions. At the regional level, the Statutory City of Olomouc and the Olomouc Region are the main ones.

1. Olomouc Region - partly available on the portal - no registration required, part of the data is not publicly available (only on request for academics) - <https://www.dataok.cz/>
2. Coordinator of the Integrated Transport System of the Olomouc Region - not publicly available (only on request for academia and the Olomouc Region)
3. Statutory City of Olomouc - partly available on the portal - no registration required, part of the data is not publicly available (only on request for academia) - <https://opendata.olomouc.eu/>
4. Olomouc City Transport Company - not publicly available (only on request for academics and the City of Olomouc)
5. Ministry of the Environment of the Czech Republic (national coverage) - partially available on the portal - no registration required, part of the data is not publicly available (only on request for academia) - <https://opendata.mzp.cz/>
6. Agency for Nature and Landscape Protection (national coverage) - available on the portal - no registration required, most data publicly available without restrictions - <https://gis-aopkcr.opendata.arcgis.com/>
7. Czech Hydrometeorological Institute (nationwide coverage) - partially available on the portal - no registration required, most of the data is not publicly available (some data charged, some data free for public administration) - <https://open-data-chmi.hub.arcgis.com/>, <https://www.chmi.cz/historicka-data/pocasi/zakladni-informace>, <https://www.chmi.cz/informace-a-sluzby/nabizene-sluzby/produkty-a-sluzby>
8. T.G.Masaryk Water Research Institute (nationwide coverage) - partially available on the portal - no registration required, some data not publicly available (only on request for academia) - <https://heis.vuv.cz/default.asp?typ=00>
9. Ministry of Transport of the Czech Republic (nationwide coverage) - partially available on the portal - no registration required, part of the data is not publicly available (only on request for academics)
10. Directorate of Roads and Motorways (national coverage) - partially available on the portal - no registration required, part of the data is not publicly available (only on request for academics) - <https://www.rsd.cz/silnice-a-dalnice/scitani-dopravy>

3. Open Data use cases

Key insights:

- Smart agenda is financially supported so there is an opportunity to set up terms for open data collection support
- There is a strategy and hackathons are organized with various topics
- The relevant topics for EnCLOD project are urban development, sustainable mobility, public safety/health/education and green infrastructure and sustainability



- The key open data for data driven urban development besides IoT, selected by UPOL, are 3D city model, satellites readings, localization of national open data for urban planning

There is no program focused exclusively on open data. However, it is a very attractive topic that fits very well into the smart city concept. Therefore, the Olomouc Region is offering for the second year in a row the possibility for individual municipalities in the region to apply for financial support for smart projects within the SMART Region Olomouc project. One of the areas for which funding is allocated is open data. Information about the region's grant programme is available only in Czech: <https://udeska.olkraj.cz/dokument?ude?KUOL0B5VGK28-0>

The organisation of hackathons was recommended by the document "Concept of the open data portal of the Olomouc Region", which was prepared in 2022 by the Department of Geoinformatics of Palacký University in Olomouc. The event was recommended to be organised in the greatest possible synergy between the city, the region and the university. The Olomouc Region initiated the organisation of the first edition in 2023, which was organised by Palacký University in cooperation with the Olomouc Region, the City of Olomouc and the Innovation Centre of the Olomouc Region. The event will take place again this year (18-20 October) with the financial support of more than 20 partners. The organisation of the event is mainly provided by the staff of the Department of Geoinformatics and the Science and Technology Park (both from Palacký University), while the financial support (mainly catering and promotion) is provided by the Olomouc Region and the City of Olomouc. The prizes are obtained mainly from commercial partners (mainly small HW) and from the city and the region (e.g. tickets to the zoo, aquapark, etc.). The total amount of prizes is approx. 5K Euro. More information is available on the event website: <https://hackathon.upol.cz/>.

Last year's hackathon dealt mainly with the topics of **cycling, quality of life and urban development (urban planning)**. This year's hackathon themes are **education, safety, health, sustainability and green infrastructure**.

- 3D model of the city/area (with heights, etc.) available to the public or to professionals,
- high resolution satellite imagery (1 m) available to the public,
- Data available for pilot area as open data produced by national agencies: DEM, DSM, variety of statistical data for all administrative units, detailed topographic data, aerial imagery, detailed data about hydrology, nature protection

4. Open Data maturity assessment

Key insights:

- Data availability can be evaluated at moderate level
- Data quality on moderate-high level
- Data use is growing so on emerging level
- Governance established (portal, staff, strategy, events)
- Impact is low to some

Open data is a new topic in the region and is developing very rapidly. Last year, the city of Olomouc developed its open data portal and this year the technological background is changing and a new version of the portal is being created. The Olomouc Region is following the Open Data Portal Concept developed by Palacký University. Two full-time positions have been dedicated to open data issues and the region made the first live version of the portal available with the first data during the summer. A publication plan has been developed and the region is actively developing the portal. The state of the city open data portal is rather weak (when compared to other regional cities), however some comparable cities in the Czech



Republic do not have a portal yet. The region portal is very new, but it has already become one of the most successful in the Czech Republic. If the region maintains the set pace of data publication, it will be a very good example of what region portals should look like. However, a whole range of data is still waiting to be published, both at the city and region level. So overall, the state of open data in the region is mediocre, but developing very quickly.

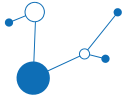
Low - Open data are used only for a few topics (environment, etc.)

Moderate - City/region strategy provides political and financial support for open data agenda, there is a scheme for staff training and city agendas data opening process established

Final evaluation of the state of the art for Olomouc city and region

The high-level governance in Olomouc area is a major power for open data agenda and the project EnCLOD can be successful in real use of open IoT data from the pilot action in Olomouc for practical SW tools. The major step now is to introduce the topic to a wider local audience and prepare the agenda of hackathon 2025 with challenges and topics to solve with the support of open IoT data. Olomouc can play a leading role in the project EnCLOD. The way forward consists in the focus on data availability and data use, and grow the impact so these three dimensions can be improved even within the timeframe of the project.

Dimension	Initial	Emerging	Established	Leading
Data Availability	Limited	Moderate	Broad	Comprehensive
Data Quality	Low	Moderate	High	Excellent
Data Use	Minimal	Growing	Active	Highly Active
Governance	Informal	Initial	Formal	Advanced
Impact	Low	Some	Clear	Significant



E. Open Data maturity level in the City of Nova Gorica

1. Institutional framework of Open Data

Key insights:

- Open data agenda on national level is well defined, instructionally settled and develops quite well. At the state level, there is a national coordinator covering open data activities, the Open Data and Intellectual Property Institute (ODIPI, founded in 2023, see www.odipi.si).
- Open data is mainly static, IoT open data are used only for specific projects (as the Road Speed Meters of Municipality of Nova Gorica, www.nova-gorica.si/prikazovalniki-hitrosti), otherwise they represent a new way of thinking.
- Slovenia has a Digital Slovenia Strategy with objectives to open data; this should be further investigated.

Open Data is subject to specific regulations in Slovenia. The country has implemented national laws and guidelines to facilitate the accessibility and re-use of public sector information. The primary legislation governing Open Data in Slovenia is the Access to Public Information Act (Zakon o dostopu do informacij javnega značaja, ZDIJZ). This Act aligns with the European Union's Open Data and Public Sector Information (PSI) Directive, ensuring that Slovenia complies with EU standards on Open Data. The Access to Public Information Act mandates that public sector bodies must provide access to public information, promoting transparency and accountability. It specifies the conditions under which public data can be re-used, encouraging the development of new services and applications. The law ensures that all potential users have equal access to public data without discrimination and outlines the circumstances under which fees can be charged for data access, generally promoting free availability unless specific exceptions apply.

Slovenia has developed several strategies and action plans to support Open Data initiatives. The government operates an Open Data portal (data.gov.si), which serves as a centralized platform for accessing public sector data. The Digital Slovenia Strategy includes objectives related to Open Data, aiming to enhance digital transformation and innovation. Additionally, the Ministry of Public Administration provides guidelines to public institutions on how to publish data in open formats. These measures are designed to facilitate the use of Open Data, stimulate economic growth, and foster innovation by making public sector information readily available to citizens, businesses, and researchers.

2. Open Data providers and tools

Key insights:

- The open data culture is developing, the broader cooperation among the national level, regional and local level is still a challenge, various supportive program on national level settled, UL could focus on description of supportive programmes
- Silo based thinking still at place, no national strategy on IoT data collection in the public space
- Private open data integration is still not the issue



- The majority of open data is static, no technical standard for open IoT/dynamic data
- Ministry of Public Administration is a key partner, their approach should be described and they could become a partner for the hackathon. Also the Chamber could be useful for training and education, their education portfolio should be investigated and compared to UNIZA training programme preparation

In Slovenia, several national and regional organizations are responsible for collecting and providing data on the environment, water, energy, waste, and transport. Below are the key organizations for each sector:

Environment: Slovenian Environment Agency (Agencija Republike Slovenije za okolje, ARSO): This government agency under the Ministry of the Environment and Spatial Planning is responsible for monitoring and providing data on environmental conditions, including air quality, climate change, and biodiversity.

Water: Slovenian Environment Agency (ARSO): ARSO also handles hydrological data, overseeing water quality, river flow rates, and groundwater levels.

Water Directorate of the Republic of Slovenia (Direkcija Republike Slovenije za vode, DRSV): This directorate manages water resources and infrastructure, collecting data on water usage, flood risks, and water management practices.

Energy: Energy Agency of the Republic of Slovenia (Agencija za energijo): An independent regulatory body that oversees the energy sector, it collects data on electricity and gas markets, renewable energy sources, and energy consumption patterns.

Statistical Office of the Republic of Slovenia (Statistični urad Republike Slovenije, SURS): Provides comprehensive statistical data on energy production, consumption, and energy balances across different sectors.

Waste: Slovenian Environment Agency (ARSO): Responsible for collecting data on waste generation, recycling rates, and waste treatment methods, including hazardous and non-hazardous waste.

Ministry of the Environment and Spatial Planning (Ministrstvo za okolje in prostor): Oversees national waste management policies and collects data to inform legislation and strategic planning.

Transport: Ministry of Infrastructure (Ministrstvo za infrastrukturo): Responsible for transport policy and infrastructure development, it collects data on road, rail, air, and maritime transport.

Slovenian Infrastructure Agency (Direkcija Republike Slovenije za infrastrukturo, DRSI): Manages national infrastructure projects and gathers data on transport networks and traffic volumes.

Public Agency for Railway Transport of the Republic of Slovenia (Javna agencija za železniški promet Republike Slovenije): Collects and provides data specifically related to railway transport.

Statistical Office of the Republic of Slovenia (SURS): Offers statistical data on various modes of transport, vehicle registrations, and commuter patterns. While these national organizations play a significant role in data collection and dissemination, local municipalities in Slovenia may also have their own departments for environmental protection, water management, waste services, and local transport. These municipal departments often collect data pertinent to their specific regions and may collaborate with national agencies to ensure comprehensive data coverage across the country.

Official Websites and Portals:

Most organizations provide direct access to their datasets through their official websites. ARSO: www.arso.gov.si SURS: www.stat.si Energy Agency: www.agen-rs.si

National Open Data Portal: The Slovenian government also consolidates datasets from various agencies on the National Open Data Portal (data.gov.si), facilitating easier access and searchability. While the majority of data is openly available, some sensitive information may be excluded to comply with privacy laws,



national security concerns, or intellectual property rights. In such cases, access may be restricted, and users might need to demonstrate a legitimate interest or obtain permission to access the data.

Ministry of Economic Development and Technology (Ministrstvo za gospodarski razvoj in tehnologijo):

This ministry implements programs that support innovation and entrepreneurship, encouraging the use of **Open Data in developing new products and services**. Financial support for projects that utilize Open Data for innovative solutions. Small grants to SMEs for services like feasibility studies and prototyping involving Open Data.

Ministry of Public Administration (Ministrstvo za javno upravo):

The ministry is a key driver of Open Data initiatives in Slovenia. It oversees the national Open Data portal (data.gov.si) and implements policies to enhance Open Data accessibility and usability. Developing frameworks and standards for data publication. Organizing workshops and training for public sector employees on data management.

Digital Innovation Hub Slovenia (DIH Slovenija): DIH Slovenia acts as a one-stop-shop for companies—particularly SMEs—to improve their competitiveness through digitalization, including the use of Open Data. Providing expertise on integrating Open Data into business models. Connecting companies with technology providers and researchers.

Slovenian Enterprise Fund (Slovenski podjetniški sklad): Provides financial incentives to startups and SMEs, including those leveraging Open Data. Seed Capital: Early-stage funding for startups. Low-interest loans for small businesses engaging with Open Data projects.

Technology Park Ljubljana (Tehnološki park Ljubljana): An incubator and accelerator supporting startups and companies working with innovative technologies, including Open Data applications. Offering office space, mentorship, and access to investors. Hosting events focused on Open Data and technological innovation.

Chamber of Commerce and Industry of Slovenia (Gospodarska zbornica Slovenije): Promotes Open Data use among businesses and facilitates collaboration between the private sector and government. **Educational sessions on the benefits of Open Data.** Working with government bodies to create favourable conditions for Open Data utilization.

3. Open Data use cases

Key insights:

- Hackathons are organized irregularly by various players with various topics
- The relevant topics for EnCLOD project are urban development, sustainable mobility, public safety/health/education and green infrastructure and sustainability
- The key open data for data driven urban development besides IoT, selected by UL, are 3D city model, satellites readings, rain, solar radiation and meteo stations readings

Hackathons are organized in the Primorska region, although their frequency may vary. Institutions like the University of Primorska in Koper occasionally host hackathons and technology-related events aimed at students and professionals interested in software development, data analysis, and innovation. Additionally, organizations such as the **Primorska Technology Park (Primorski tehnološki park)** in Nova Gorica support startups and technological initiatives, sometimes organizing hackathons or innovation challenges to foster collaboration and entrepreneurship in the region. <https://www.startup.si/en-us/event/6th-international-cassini-hackathon>, https://www.famnit.upr.si/sl/novice_studenti/cassini-hackaton---s,



<https://www.primorski-tp.si/en/primorski-tehnoloski-park-hosts-popri-startup-challenge-from-talents-to-the-danube-regions-strengths/> <https://www.famniti.upr.si/en/news/2305>

As a benchmark for the Open Data and IoT advancement of the city of Nova Gorica, it can be considered the existence of meteo stations readings (with rain and solar radiation measurement) and high resolution satellite images available to the public.

4. Open Data maturity assessment

Key insights:

- Data availability can be evaluated at moderate level
- Data quality on moderate-high level
- Data use is growing so on emerging level
- Governance established (portal, staff, strategy, events)
- Impact is low to some

The Nova Gorica region, located in the Primorska area of Slovenia, has shown interest in embracing Open Data initiatives, but its level of Open Data maturity can be considered developing. While Slovenia as a whole has made significant progress in promoting Open Data at the national level, the implementation and utilization at the regional and municipal levels, including Nova Gorica are still evolving.

High - Many cases of Open Data use can be observed

Moderate - City/region strategy provides political and financial support for open data agenda, there is a scheme for staff training and city agendas data opening process established

Dimension	Initial	Emerging	Established	Leading
Data Availability	Limited	Moderate	Broad	Comprehensive
Data Quality	Low	Moderate	High	Excellent
Data Use	Minimal	Growing	Active	Highly Active
Governance	Informal	Initial	Formal	Advanced
Impact	Low	Some	Clear	Significant



F. Open Data maturity level in the City of Žilina

1. Institutional framework of Open Data

Key insights:

- Open data agenda on national level is well defined, instructionally settled and develops quite well. At the state level, there is a national coordinator covering open data activities.
- Open data is mainly static, IoT open data is totally new way of thinking.
- Slovakia has a Open Government Initiative Action Plans with an annual report; the report structure and findings should be further investigated as well as the impact evaluation/objectives

Only the national level is concerned, at the level of the Pilot Area (City of Žilina) the strategy/concept/regulation is being prepared.

National level:

Constitution of the Slovak Republic (Act no. 460/1992): "Public authorities have an obligation to provide information on their activities in the national language in an appropriate manner. The conditions and method of implementation shall be laid down by law."

Act on GDPR (Act no. 18/2018): Open data often contains personal data of an identified or identifiable data subject. Municipalities and cities are in the position of the information system operator and must ensure compliance with legal requirements in the area of personal data protection

Act on free access to information (Act no. 211/2000): clearly defines the information to be made public, the time limits, the remedies, the range of obliged persons and the institute of making information available on request

Regulation on standards for public administration information technology (Regulation no. 78/2020): regulates the technical requirements for the publication of datasets

National Concept of Informatisation of Public Administration (2015, updated 2021): ensures that the public administration publishes information as standard in the form of open data, provides methodological, educational, awareness-raising, motivational and technical support

Open Government Initiative Action Plans in the Slovak Republic (usually in 2-year cycles): thanks to the implementation of the action plans, the portal data.gov.sk (later data.slovensko.sk) was established, technical standards for open data datasets were set, and the task of creating a publishing minimum was defined; the last action plan for 2024-2026 includes the task to increase the use, re-use of open government data and to produce **an annual report on the impact of open data in the Slovak Republic on selected areas**



2. Open Data providers and tools

Key insights:

- The open data culture is developing, the broader cooperation among the national level, regional and local level is still a challenge
- Silo based thinking still at place, no national strategy on IoT data collection in the public space
- Private open data integration is still not the issue
- The majority of open data is static, no technical standard for open IoT/dynamic data
- Energy Company of the City of Žilina ESMŽ could be a partner for the hackathon
- The quality of the data varies, and much of it is not yet published as open data
- Capacity-building is required to improve data management and utilization

The main providers responsible for collecting and providing data for the territory of Žilina at the local level are the City of Žilina and its subsidiaries. In the areas of Environment, Water, Energy, and Waste, the City of Žilina gathers data either directly or through its subsidiary, the Energy Company of the City of Žilina (ESMŽ). ESMŽ is a newly established entity responsible for managing all energy-related activities, including engineering, energy management, renewable resources, and the integration of smart technologies. However, the quality of the data varies significantly, and these datasets are not yet published as open data. A strategy for managing and releasing open data is currently being developed.

In the area of Transport, the City of Žilina collects and provides data through its public transport operator, DPMŽ, which oversees the city's transport services. Additionally, selected data related to Environment and Transport at the local level are published on the City of Žilina's portal (<https://smart.zilina.sk/>). These datasets are available to the public to enhance transparency and access to information.

At the national level, several institutions are responsible for open data. The Slovak Hydrometeorological Institute (SHMÚ) collects and provides environmental data, including information on weather conditions, air pollution, and the hydrological situation (www.shmu.sk). In the transport sector, the National Railway Company Slovakia (ZSSK) provides data on suburban and intra-urban passenger transport, focusing on train timetables (www.zssk.sk). The Railway Infrastructure Manager (ŽSR) offers data on train delays (www.zsr.sk), while the Slovak Road Administration (SSC) manages the road network model and provides relevant data through the Road Databank (www.ssc.sk and <https://ismcs.cdb.sk>).

3. Open Data use cases

Key insights:

- Hackathons are organized regularly as well as many irregularly by many players with various topics, also private players, so the issue is to set up a suitable portfolio of partners for Žilina hackathon as a guidance on open IoT data partners and overall interest investigation
- There are many funding opportunities in Slovakia, check whether they supported open data and which ones.
- The relevant topics for EnCLOD project are urban development, sustainable and green mobility, climate change and the quality of life



- The key open data for data driven urban development besides IoT, selected by UNIZA, are 3D city model, satellites readings, rain and meteo stations readings

The use of open data, projects for their implementation in the life of municipalities, universities, schools are financed from several sources:

- **Slovakia's recovery and resilience plan within the Digital Slovakia component**

- **resources from Horizon projects** and similar project schemes, where outputs in the form of open datasets are part of the projects. The use of open data within municipalities is significantly supported by national and EU grants.

- **Innovation vouchers via Slovak Recovery and Resilience Plan** were aimed at stimulating the cooperation of SMEs that have the potential to increase their competitiveness through innovations of own products, services and/or processes with research institutions, universities, private providers research and development services and municipalities.

- **Digital vouchers via Slovak Recovery and Resilience Plan** were aimed to individualized solutions for businesses (subject of support is the development of a proposal for an individualized solution, but not his implementation itself) in specific areas of digitization. They enabled a wide range of solvers/providers, starting with other companies, digital innovation centres, universities or even municipalities, to identify possibilities in the field of digitalization of processes and services and thus contribute to the start of a digital transformation that would fundamentally change the functioning of companies and the provision of value to customers.

- **Alvaria - civil association**, which was founded in 2014. Alvaria connects different innovation and technology-oriented communities into a functional platform for exchanging experience, helping municipalities to open data and providing feedback, analytical, consulting, educational activities in the field of data, organization of workshops, conferences, events, processing publicly available open data, etc. In the period 2/2019-7/2021 they implemented **the project Open Data in Regions**, which was supported by the Operational Programme Efficient Public Administration.

- **Transparency International Slovakia** - as part of the project "Open Self-Government" regularly evaluates municipal open data (<https://samosprava.transparency.sk/>). It publishes transparency **ratings of the 100 largest cities and municipalities**. The existence of the portal, the number of datasets published, the publication of publication minimum datasets and high-value datasets in the field of mobility and environment were evaluated.

1. Startup Weekend Žilina is regularly held in Žilina.

It is an (intense) **54-hour hackathon** where participants get the space to bring their idea to life. The idea doesn't have to be technical. If they don't have an idea, then they can be part of a team with an idea which they decide to support. Participants are usual programmers, UX designers, marketers, business specialists, idea makers, specialists in law, domain experts or experts in a particular branch of industry.
<https://www.startupweekendzilina.sk/>

a. Organizers - license holder. Colleagues from CTT UNIZA also collaborated within the organizational team of this event. UNIZA is usually the media partner of the event.

b. Partners - <https://www.startupweekendzilina.sk/>

c. Prizes - More or less useful advertising items, merch from our partners, after event mentoring, tickets for next events, software licences and subscription plans...

Irregular events:

2. Spaceport Hackathon in Žilina



3-day hackathon and dive into challenges designed by the United Nations Development Programme - <https://spaceoffice.sk/spaceport-hackathon/>

a. **Organizers** - Slovak Space Office (Spaceport incubator) SARIO

b. **Partners** - UNIZA, Technology Incubator of UNIZA, ... <https://spaceoffice.sk/spaceport-hackathon/>

c. **Prizes** - More or less useful advertising items, merch from our partners, after event mentoring, data from the mobile operator

3. Citython Žilina 2022 -

Citython 2022 was an international event focusing to urban challenges in RIS countries in which the participating teams work on implementing their ideas from inception to presentable project or prototype in 54 hours. We were aimed at urban mobility, where a group of experts and students in the fields of urban issues, business, UX, marketing and big data worked together to create innovative solutions for our cities. During the weekend, the teams were accompanied by experienced mentors and speakers. The culmination of the evening were 5-minute presentations, Q&A and evaluation by a panel of judges who selected the 3 winning teams. <https://www.citython.sk/2022zilina/>. This project was funded by EIT Urban Mobility, an initiative of the European Institute of Innovation and Technology (EIT), a body of the European Union. EIT Urban Mobility acts to accelerate positive change on mobility to make urban spaces more liveable. <https://www.eiturbanmobility.eu/events/citython-zilina/>.

a. **Organizers** - UNIZA (Center for Technology Transfer UNIZA), KAJO services, s.r.o., PowerHUB, CARNET (Future Mobility Research Hub).

b. **Partners** - <https://www.citython.sk/2022zilina/>

c. **Prizes** - 3,000€ in CASH prizes was given for the best solutions + 3x GARMIN Venu Watches and other useful advertising items and merch from our partners.

4. **Other hackathons** are also held in Žilina, which are usually organized by companies on topics related to their business.

- mapathon <https://geocommunity.sk/missingmaps/slovakia/>)
- <https://uic.org/com/enews/article/first-uic-trainrail-hackathon-held-at-the-university-of-zilina-in-collaboration>

Yes - Citython Žilina 2022 was aimed at solving similar problems. Challenges were:

1. **Help your city management to promote smart mobility** and foster change towards more sustainable and climate resilient cities.

2. **Engagement of the public in city planning and development** towards smart mobility, and safer, greener and more liveable city.

3. **Building smart mobility** in the context of extreme weather and humanitarian emergencies.

The mayor of the Žilina City as well as the city representative who was one of the Jury members asked the organisers from the University of Žilina for a short presentation of the results of the Citython. The presentation was addressed to the representatives of the Žilina City in various fields. The aim was to present the proposed solutions and identify these that the Žilina City could implement. A representative of the Žilina City, who was a member of the Jury, helped with the presentation. Representatives of the Žilina City positively appreciated the data inventory, which was carried out for the purposes of the event, the scope and content of the prepared data for participants, as well as the addition of open data in Citython themes. This data inventory was also beneficial for representatives of the Žilina City <https://www.citython.sk/2022zilina/>.

The following data is also available for the pilot area:



- 3D model of the city/area (with heights, etc.) available to the public or to professionals,
- meteo stations readings available to the public as Open Data,
- high resolution satellites readings (1 m) available to the public,
- rain measurement available to the public as Open Data.

4. Open Data maturity assessment

Key insights:

- Data availability can be evaluated at moderate level
- Data quality on moderate-high level
- Data use is growing so on emerging level
- Governance established (portal, staff, strategy, events)
- Impact is low to some
- Twinning: Žilina should inspire from Olomouc where open data concept has been worked out

Open data maturity is low/young. City of Žilina is heavily dependent on our technical partners and are quite passive in making datasets (if existent) available to the public. The city of Žilina suffers from the fact that it does not have an open data concept. So far, it has prepared a concept for the development of IT systems and has carried out a passporting of data sources.

Open Data are almost never used. In many cases, if a decision based on data is necessary, these are ad-hoc cases and the data are mostly non-public.

There is support and a framework for Open Data at national level, but local municipalities often fulfil this framework only formally (e.g. by meeting the publication minimum). By joining Clevernet and EnCLOD projects, the City of Žilina showed that it's aware of the need for progress in the area of Open Data

Dimension	Initial	Emerging	Established	Leading
Data Availability	Limited	Moderate	Broad	Comprehensive
Data Quality	Low	Moderate	High	Excellent
Data Use	Minimal	Growing	Active	Highly Active
Governance	Informal	Initial	Formal	Advanced
Impact	Low	Some	Clear	Significant



G. Comparison and gaps analysis in EnCLOD territories

D.1.1 lessons learnt and the potential achievement

Open data provision is well established however open IoT data is a brand-new issue in all the territories. The best practice to follow has been derived from Deliverable 1.1 use cases overview. Barcelona Sentilo platform, provided as open SW, with more than 15 000 sensors in operation, is perceived as a very good example to follow or get inspired by.

The main reason Barcelona digitizes for is the Green Deal agenda. So, another input from D.1.1 is connected with relevant topics/agendas that the sensors networks are used for. Climate change and environment issues, traffic/mobility counting, water management and partially energy management have been evaluated as the strong cases to follow as being relevant to Green Deal investments.

The overall philosophy of the EnCLOD project builds on raising awareness about the potential of IoT networks data for urban development planning, mainly connected on near future investments in green and digital transition, that can become a strong benefit of city/region, if made as open data, for making governance more efficient, bring significant savings in the planned Green Deal investments, provide knowledge and digital skills to relevant administrators, all this through new or upgraded SW tools. Open data should be seen as a **new public service** that brings efficiency as well as supports digital economy across domains and across borders. **Holistic design of city/region IoT networks** is a crucial prerequisite of the good action plan together with a known portfolio of tools and apps using the IoT open data in practice.

That is why EnCLOD, in its highest achievement, at the end of the project, might provide a potential twinning of pilot areas based on the SW tool developed in one area to be used/adapted/commented by another pilot area and to get the baseline of the role of public sector in IoT open data provision and the benefits gained from this approach, as a part of the final Guidance. *(probably this should be avoided)*

The comparison procedure

There are significant differences in the partners knowledge and competencies. UPOL, as the expert partner in geoinformatics, have broader knowledge on open data as well as local data so Olomouc case can serve as a leader in preparing Local Action Plans of the project areas. On the other hand, a public transport company of Debrecen is responsible for the operation of public transport; open data is a brand-new issue for them. So, the Action plans of the partners' areas will be very different **based on the compared state of the art**.

To provide a benchmark for the evaluation the **Open Data Maturity Evaluation Scheme** (annex 1) has been used. All the partners' areas have provided their answers to the questionnaire (annex 2). The answers have been compiled into this document and then the conclusions for every area and every chapter have been formulated. Then all the partners have provided their "self-assessment" based on Maturity scheme as the final result of the gap analysis and this assessment has been compiled into a single table assessment, see below.

Then all the partners have an opportunity to change their assessment while comparing their view with the other areas advancements. Final step in comparison, the expert evaluation, has been provided by UPOL and CityOne to confirm/change the self-assessments results and if there has been a change they provided feedback to the particular area evaluator.

The relevant common topics for EnCLOD project are:

- Urban development (all the partners)
- Mobility (all the partners)
- Climate change (some partners)



Conclusion: mobility and climate are topics of no personal data obligations so their potential to be published as open data is enormous and many benefits can be obtained mainly for urban planning and Green Deal investments. The project at the later stage should focus on SW application twinning terms and obstacles to adapt the final Guidance.

The key open data for data driven urban development besides IoT have been identified:

- 3D city model (all the partners)
- satellites readings (all the partners)
- rain and meteo stations readings (all the partners)
- solar radiation (most of the partners)
- traffic counts (some of the partners)
- drones and thermocameras (one partner)
- localization of national open data for urban planning (one partner)

Conclusion: The Green Deal approach is the right track when designing IoT networks in a holistic way. The 3D map environment enabling the simulations of climate change impacts (mainly investigate shading, wind cooling effects, green measures effects...) is complemented with energy issues (solar radiation and traffic counting). The step to localize national open data in the city/region context/single map is also seen as a very important input for Local action plans.

The single table assessment - a comparison among the project partners' areas

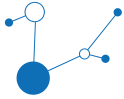
Dimension	Initial	Emerging	Established	Leading
Data Availability	Debrecen Žilina	Vicenza Olomouc Žilina	Nova Gorica	
Data Quality		Vicenza Debrecen Olomouc Žilina	Vicenza Olomouc Nova Gorica	
Data Use	Nova Gorica Žilina	Vicenza Debrecen Olomouc Nova Gorica		
Governance	Debrecen	Nova Gorica Žilina	Vicenza Olomouc Nova Gorica	Olomouc
Impact	Vicenza Debrecen Olomouc Žilina	Vicenza Debrecen Olomouc Nova Gorica Žilina		

Note: Some areas advancement fits to two levels so they are classified in more than one field.



Based on the comparison among the project areas the following conclusions can be considered:

- Olomouc area/UPOL could provide a good practice on Governance of open data to the other project partners as the university has worked out the Olomouc region open data strategy and UPOL is the only partner in the project EnCLOD specialising on geoinformatics.
- The common status in all the areas is that open data is available and of good quality but there is low use and so low impact on the governance or digital economy. The logical primary task of the partners will be to focus on building local open data ecosystem through local workshops and hackathons and mapping the key levers as well as obstacles for digital services based on open (IoT) data.
- For further promotion of the IoT open data potential a possible twinning activity can be triggered later on in the project. If the project is successful in developing SW tools/applications based on the data from the pilot actions, by the partners themselves or through the hackathons, the twinning, i.e. launching a tool/application developed in an area in another area, could be an ultimate achievement of the project. Such a result can become a corner stone for future activities and projects, delivering the guidance on how to deploy IoT systems, how to open their data and how to use already developed digital tools and applications in potential follower cities in the near future.



H. Conclusions

The main findings and the future steps

The gap analysis now serves for the follow-up steps:

- **design a proper methodology** for Action plans
- **provide a good example** of Olomouc as the inspiration for the other areas plans, based on the findings from D.1.1 and the gap analysis D.1.2 results.
- **Identify the advancements** in open data agenda among the partners and make them work out these potential good practices in more detail for the benefit of all.
- **Identify the tasks** (to tackle weak points) to be inserted into Action plans

Common tasks and the relevant partners tasks

The next period tasks for all the partners or particular partners are another output from the gap analysis.

Some conclusions (common tasks) have been made in comparing the best practice of Barcelona Sentilo case and are valid for all the partners areas:

- **Overcome silo-based thinking** by holistic design of IoT sensors networks to map the overall potential of IoT open data in the city/region and built on the Action plan based on the state of the art and specific priorities
Conclusion: Every Action plan has to be designed in a holistic way
- **Prepare a technical standard on IoT networks and data** for a future national strategy on IoT data collection in the public space, based on the pilot actions outputs and lessons learnt
Conclusion: Every Action plan has to contain the technical terms for the IoT networks deployment
- **Showcase the potential of using public as well as private open data** integration in the most advanced pilot area: Olomouc
Conclusion: Olomouc is to prepared as a showcase for December Internal training session
- **Raise awareness that open data is not limited to static registries** but their use can be boosted by dynamic (e.g. open IoT) data to enable the provision of new services for real time operation as well as long term planning.
Conclusion: Alda is to prepare a set of cases from D.1.1 to be communicated as the series of articles on IoT open data topic - a longer-term goal
- **Role and business models** of city and region administration should be investigated in more details, with the aim to find a model suitable for **IoT open data as a public service**, as well as relevant communities and private actors' roles
Conclusion: Based on the partners' tasks below a model of IoT open data as a public service should be worked out - a longer-term goal



The potential good practice identified by the gap analysis by a partner should be further worked out to contribute to the project final goals; these have been identified in the following areas:

Vicenza/UIAV tasks:

- Water data and environment data are provided real time by Regional Environmental Agency of Veneto and **can be examined regarding the data standard as well as the apps/tools/SW profiting from the data availability**
- Open data collection support is mainly assured by European projects and local community organized by Digital innovation hub of Vicenza and Foundation for university studies; so **Vicenza is strong in community and can provide further info** for the project partners Local action plans.
- There is **guidelines for open data interoperability**, a set of tools to support the use of open data and new products and services on the topics of mobility, environment and tourism; **Vicenza can share good practice with the project partners** to support their Local action plans as well as the methodology.
- Vicenza is to work out a more detailed **description of the outputs of Copernicus hackathon** (use of IoT) to identify the existing data sources, use cases and products

Debrecen tasks:

- Action plan should start the open data activities, twinning is very important, Debrecen represents a partner who should start **building open data strategy from the scratch**.
- **Training materials prepared by UNIZA could be tested on Debrecen staff** first to get the feedback and help them get on the track. Probably the training materials should be simplified and can work in two variants.
- It can be expected that the Action plan of Debrecen will be completed much later than the others' and will be different. Learning by doing is the approach for Debrecen. They should attend the Internal training session and **work out the feedback and conclusions** for their approach to the Action plan.

UPOL/CityOne task:

- **Internal training session should be organized**; study visit in Žilina helped a lot to understand the IoT world and its potential but open data agenda setting and technical issues need to be trained on a special session (webinar) organized by UPOL in December 2024
- UPOL is a very advanced partner for the pilot area having real experience with open data concept, local data knowledge, its application and hackathons organization and is also a methodological partner for the city as well as the region. CityOne provides strategic design, climate/traffic/ITS and the knowledge of IoT networks, also based on CleverNet for Olomouc case.
- Olomouc case has already been working out as **a showcase of a potential Action plan** respecting holistic approach to the design, focusing on IoT topics with no data protection obligations (climate and traffic), introducing the plan to local partners and target groups (special local workshop organization) and using/integrating available open data from public and private sources to "one map" (longer term goal)
- The next step is to organize a **meeting with the state digital agency (DIA)** to get some feedback on the plan and process, and to discuss a potential for national IoT data strategy as well as a supportive programme.



UPOL task:

- UPOL can share the result and the process of **creating a regional strategy on open data** and prepare an Internal training session for the project partners.

UL tasks:

- Slovenia has a **Digital Slovenia Strategy** with objectives to open data; this should be further investigated; the goals, funding, strategy and communication as well as IoT open data should be worked out in more details
- The open data culture is developing, the broader cooperation among the national level, regional and local level is still a challenge, various supportive program on national level settled, UL could focus on **description of supportive programmes**
- **Ministry of Public Administration is a key partner, their approach should be described** (policy, competencies and roles, Action plan) and they could become a partner for the hackathon. Also the Chamber could be useful for training and education, their **education portfolio should be investigated and compared to UNIZA training programme preparation**

UNIZA tasks:

- Slovakia has a **Open Government Initiative Action Plans with an annual report**; the report structure and findings should be further investigated as well as the impact evaluation/objectives
- **Energy Company of the City of Žilina ESMŽ** could be a partner for the hackathon; the initial meeting should be organized to identify potential for training as well as opening some datasets (energy data aggregation potential)
- Hackathons are organized regularly as well as many irregularly by many players with various topics, also private players, so the issue is to set up a suitable **portfolio of partners for Žilina hackathon as a guidance on open IoT data partners and overall interest investigation**
- There are **many funding opportunities in Slovakia**, check whether they supported open data and which ones.
- Twinning: Žilina should **inspire from Olomouc** where open data concept has been worked out

Final conclusion

The parallel work on D.1.1 and D.1.2 started a learning by doing process, identifying strong/shareable and weak/to overcome issues in national or local open data agenda. It helped the partners to see the state of the art of their place in comparison with the others as well as with the best practice of Barcelona and the results now serve as for the methodology task so as for Local Action Plans design and timing. The project EnCLOD is to build on the conclusions specified in this document.