

INNOCAP



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INNOCAP – Needs Analysis Report D1.1.1



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1 Introduction

Need analysis or *needs assessment* is a systematic process for determining and addressing needs or "gaps"¹. In this document, we are gathering the input collected from INNOCAP partners on their specific innovation needs. This work is a starting point for Activity 1.2 and creating the disruptive innovation map for next-gen sustainable public services through relevant cutting-edge technologies. We intend to make this a working document open for further updates since we expect partners' needs to evolve as we expose them to disruptive technologies in a loop of interactions, workshops and presentations.

2 INNOCAP Pilots

The INNOCAP consortium has pre identified a set of four initial pilots that are going to be considered for implementation.

2.1 Building a digital innovation platform for public services (Västernorrland) – ALAV

The pilot focuses on a service to provide digital innovation coaches with a new role created, with service design and innovation methodologies skills. It will be supported by a digital platform for idea generation and prioritization. In parallel, aim at creating a digital platform or tool for innovative processes where the municipality's employees receive support to explore and develop their ideas and challenges.

We will work closely with 1-2 selected municipal activities, for example, the initial target groups envisaged are home care service, the labour market unit and the library staff.

2.2 Waste data hub (Iceland) – SASS

SAAS has been working on analyses in the field of waste management. Based on these analyses, a data platform "Waste data hub" (disruptive innovation) has been developed, where the goal is to develop monitoring and control tools for municipalities, intended for them to monitor and make strategic decisions based on waste issues. The Waste data hub works with all waste categories within municipalities, measuring quantity and cost figures. The municipalities can then assess where they stand in different waste categories based on the goals and conditions of the EU. Decisions on incentives, services, education, or levies on service users (inhabitants, institutions, and companies) can then be made based on the situation at any given time and the results of those decisions can be analyzed as a result.

The pilot intends to establish a service to create a knowledge center which will have an active role in educating the relevant staff of each municipality, students, businesses and the public in waste management. It will be nurtured

¹ Kizlik, Bob. "Needs Assessment Information (Wants determine needs)". ADPRIMA.



with open data coming from the research community and IoT-powered smart bins.

2.3 Social innovation led service for decision-making on digital and green transition (Mikkeli)- UH in coordination with Mikkeli

A digital service to show potential areas of dual transition and to provide evidence-based information for decision-making that advances regional capabilities in green and digital transition and their combined effects to rural and regional development.

2.4 Climate change action monitoring(Donegal) – DCC in coordination with ERNACT.

The pilots focus on service to monitor the implementation and performance of the Climate Action plan and also the local environmental conditions. Disruptive technologies like AI/Virtual Reality visualizations could help communicate scenarios that could happen if a climate action plan was not put in place.

While those candidate pilots define specific direction for the development of our capacity building programme, the scope and the direction of the pilots may be altered and new pilots may be defined as partners embark on

3 Method

3.1 INNOCAP framework

INNOCAP consortium will follow the *Capacity Building Program for Innovative Digital Public Services* along four major dimensions: 1) Digital Solutions Available, 2) Skills, 3) Delivery models, 4) Procurement of innovative solutions.

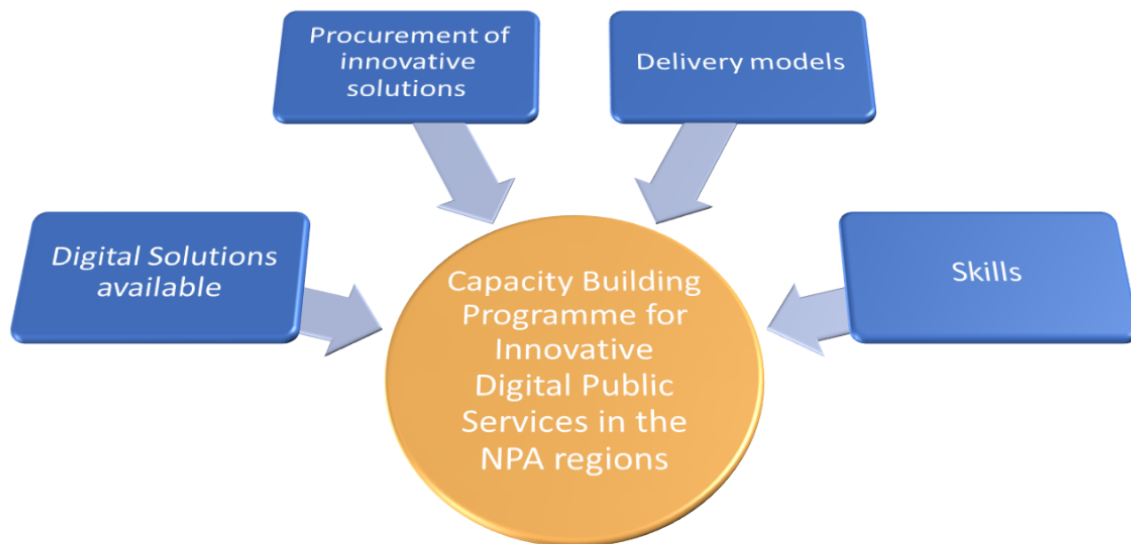


Figure 1. INNOCAP Framework

Digital solutions available

This dimension considers both the supply and the demand sides. The supply side serves to identify the existing technology providers (universities, , research centres, companies) in the region that can apply their knowledge and digital solutions for enhanced public service provision. The demand side allows to map the level of awareness/adoption of digital solutions by the public sector organizations into their processes and services

Public Procurement of innovative solutions (PPI)

This dimension assesses the level of maturity of these organizations in the exploitation of public procurement as a tool to foster innovation where there is a strong public interest and the potential to generate a positive societal impact.

Public procurement of innovative solutions happens when existing public procurement procedures (e.g. open, negotiated, competitive dialogue) are used to buy innovative solutions which are not yet available on large scale commercial basis. In public procurements of innovative solutions, the public procurer is an early adopter, also called launching customer, of innovative solutions. Early adopters are typically referred to as the first 20% of customers on the market that buy an innovative solution.

They can trigger wider deployment of innovative solutions, because their purchase signals to mass markets that there is a sufficient level of customer acceptance for the



solutions in particular in the area of digital transformation, public health and green transformation.

Delivery models

The dimension focuses on how the services are designed, developed, and delivered. This includes aspects like the use of co-creation into the processes in the service provision.

Skills (Technical and non-technical capacity)

This dimension allows mapping the level of readiness of the staff to run innovation. This will be done by mapping the current capacity and skills, including both technical and non-technical skills, required to lead the provision of innovative digital-driven public services.

3.2 Data Collection

This section describes the data collection methods employed to understand and reveal technical and non-technical needs for the capacity building sessions for exploring and adopting new technologies by the pilot organizations. The data and analysis in this section will directly inform and contribute to finalizing the needs of the pilot partners.

The data collection for needs analysis in INNOCAP project was informed by the INNOCAP framework presented in Section 3.1.

Data Collection Stages

This section provides stages to the data collection process for the needs analysis that are required for successful Capacity Building sessions. This is presented in Figure 2.

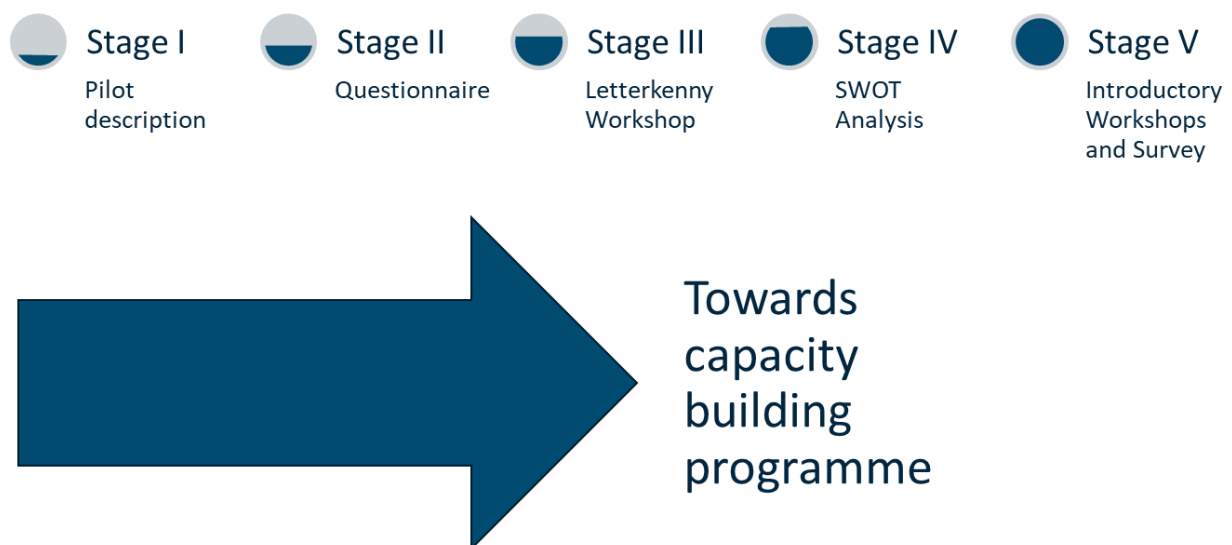


Figure 2. Data collection stages



Stage 1 – Pilot Description

In this stage, we dug deeper into the previously available data on the four pilots in this project. This helped us understand the current innovation capacity of the public sector organizations in the INNOCAP partner regions and to perform initial planning for the capacity-building sessions that can successfully address their individual needs. In addition, this has been used as a basis to identify the gaps to be addressed by the capacity-building programme intended to enable these organizations to lead innovation in their task of providing quality and sustainable public services.

Stage 2 – Initial Questionnaire

In this stage, we used the data collected in stage 1 to design and develop the initial online questionnaire to acquire more details about specific partner needs in specific thematic areas. The aim has been to explore the areas that seem unclear or need further clarification. See Appendix 1 for the list of questions asked. In Appendix 2, we present the responses from the four pilot organizations.

Stage 3 - Letterkenny Workshop

The Letterkenny in-person Workshop was collocated with the INNOCAP project kick-off meeting. In that engagement, we discussed further our observations based on Stage 1 and Stage 2 of capacity-building preparation and confronted them with partners with more in-depth elaboration and between-partner conversation. To initiate the discussion, we presented a brief introduction to the key envisaged technological areas to be investigated. After that, we allowed partners to freely elaborate upon their vision, and we collaboratively shaped that vision. Relevant feedback was recorded, and some of the highlights are presented in the further part of this document.

Stage 4 – SWOT Analysis

After we consolidated the feedback from the in-person workshop, we used SWOT analysis as our strategic data collection technique to identify each organization's strengths, weaknesses, opportunities, and threats. This provides us with new insights, such as where the organization can improve or what risks they can identify that can impact the successful procurement of the technology. The collected data is included in Appendix 3.

Stage 5 – Introductory online workshops and the follow-up survey



The first four stages of the analysis delivered a plethora of information to us. After the analysis, it was evident that partners require more exposure to emerging technologies areas to have a better awareness of possibilities and to express their service needs better. To address that, we have delivered three introductory workshops to widen partners' perspectives on the thematic areas. Specifically, this included: 1) Workshop 1: Engagement 2D & 3D/VR and AR, 2) Workshop 2: GIS, Data integration and AI chatbots, and 3) Workshop 3: IoT, Blockchain, ++. The survey sent after the workshop has been included in Appendix 4, and the results are gathered in Appendix 5.

3.3 Data Analysis

Guided by the INNOCAP framework and data collected from the pilot organizations (stages 1 to 5), we adopted a directed approach to content analysis. This approach suggests several data analysis phases where we analyze the data from each data collection stage and use the findings to refine/develop a narrower question that can get us closer to what the pilot organizations exactly need.

We initially looked for categories or areas emerging with regard to the available capacity and the highlighted needs from the pilot description (stage 1) and the first survey questionnaire (stage 2). The areas that emerged from this analysis phase guide our discussion with the pilot organizations at the workshop in Letterkenny. This workshop further revealed new technological needs and available technical infrastructure to the organizations. The next analytical phase includes qualitative analysis of the Letterkenny workshop to guide the design of our next data collection technique, in this case, SWOT analysis for each technology considered by the organizations. We performed the SWOT analysis to give us better information/idea about whether or not and on what basis the technology/technologies suit the organizations and how the capacity building sessions could be planned and organized for maximum benefit. For example, if one organization is interested in AI, do they have to or are able to acquire technical and non-technical capabilities for developing and deploying AI? What are the risks or weaknesses associated with adopting AI? And how opportunities can help them to overcome the barriers or challenges?. Next, findings from this and the previous analysis phases guide designing and developing the introductory workshops and final survey for the organizations. Last phase of analysis includes qualitative analyzing the workshop and final survey data. This phase revealed concrete organizational needs regarding technology and capacity.

4 Results from the Analysis of the Data

4.1 Results from the Primary Digital Solution Questionnaire

Climate Change Action Monitoring (Donegal County Council) - Regarding the application of digital solutions, the County Council has used digital solutions at an experimental level. This relates to the Internet of Things technology. The main fields of application have been the use of sensors for environmental management including air quality measuring, river levels monitoring and traffic management what includes



road temperature, traffic control cameras and pedestrian counters. An important aspect highlighted is that this IoT devices are an adequate solution for rural areas since they are a more affordable solution in terms of costs for installation and maintenance. This is one of the main points that shows real advantage for this technology when supporting services in these areas. They also bring real advantage from the health and safety point of view by reducing the need of human resources to go for inspections under difficult conditions. Some virtual reality solutions are being used in tourism and heritage sites and could become part of the tourist offer. They have the potential of making attractions more accessible to tourist as well as to enrich the experience.

With regards to their challenges for using digital solutions, Donegal County Council highlights that their important challenge is how to choose the right digital technology that can deliver the value proposition that they need to solve a real problem. Next challenge relates to the management style and change of the management team. This is specifically important when it's associated with the adoption of digital technologies and integrating them in the processes of the organization. Moreover, resources such as the availability of funds and time required to adopt and implement the new technologies and solutions are reported to be significantly impacting the application of digital solutions. Another important challenge or barrier relate to the lack of expertise and experience on innovation procurement. This is associated with the availability of no measures or customized/tailored capacity-building support to implement specific innovation procurement projects.

Considering the described digital technology application and the challenges of adoption by the Donegal County Council, data shows that, the County Council needs to develop an agenda and strategy to guide the digital solution identification and adoption to develop new digital solution-informed processes and public services. The core objective would be to improve and/or develop internal processes that can lead to co-creation of new digital technology-based public services.

Their primary needs suggest Donegal County Council to tap into the potentials to establish relationships and collaboration with external bodies such as Academia and Industry partners to develop a better insight into opportunities for developing capacity and adopting digital solutions for digital public services. In addition, there are also funding calls that can support financing capacity building and digital initiatives. Internal buy-in happens when the solution presented brings along the funding to be implemented. With regards to the procurement, opportunities are to develop policy framework that encourages public procurers to undertake innovation procurement and that gives an overview of existing and upcoming policy initiatives to mainstream innovation procurement, learn from good procurement practices, train and benefit from public procurement workshops, benefit from experience sharing and networking between procurers in other cities/regions, sectors, countries and etc.

Social innovation led service for decision-making on digital and green transition (City of Mikkeli - UH in coordination with the city of Mikkeli) -

With regards to the application of the digital solutions, City of Mikkeli's two perspectives include digitalization in strategies and digitalization in service provision. For the first, the



current strategy of the City of Mikkeli acknowledges the potential of digitalization and it is especially incorporated under the strategic focus area of "Sustainable and smartly renewing Mikkeli whereby on of the sub-objectives explicitly state that "Mikkeli will make full use of the potential of digitalization to develop the city's services. As for the three main service areas, there is a separate ICT-strategy for the subservice area of education. An ICT-team for education is supporting the schools in ICT-operations and skills. Apart from the education sector, there is no overarching strategy for digitalization in the City of Mikkeli. The general ICT-network maintenance such as updating the workstations and software are outsourced to an external ICT-service provider. It is not clear how the city's newly claimed strategic focus of utilizing the possibilities of digitalization to the full is to be addressed in practice. There is a need to clarify extant technological and digital capabilities in all the service areas and to create a digital vision statement for the strategic focus areas. For the latter, the service portal of the city displays a dozen of services or functionalities that can be used digitally in one way or the other. The portal encourages online transactions that are claimed to be "independent of time and place, fast and easy". Online services cover 1) Submission of a building permission, 2) Property management service requests or reports, 3) a digital show room that presents the city owned empty housing or office spaces for rent, 4) A self-service registration and an online shop communication platform between the schools and parents regarding school matters and another similar platform for communication in day-care, 5) Mikkeli city online store to purchase products from the city's museums and tickets for swimming pools and city gyms, and 6) Submission of citizen initiatives are possible through a national democracy service Kuntalaisaloite embedded in the city portal.

The current number of digital services or functionalities available over the internet is clearly higher than two or three years ago. This can be explained by the hard pressure for distance services created by the covid-19 pandemic. However, the nature of digitalization measures in the citizen interface can be considered rather elementary. It is also quite patchy, and it seems that the service areas have ended up with different solutions and background software. Apart from the chatbot in the youth service point, the disruptive technologies identified in the INNOCAP background documents are not in use or they are not advertised in the public service portal. However, disruptive technologies such as IoT, VR/AR or AI are certainly used in the backend contexts that do not directly meet the eye of the resident. Such contexts include, for example, water transmission or district heating and electricity grid systems of the companies owned by the city.

Regarding the skills and capacity, municipalities and associations of municipalities have a good understanding of the benefits of cooperation and co-development for digital development and increasing their digital capabilities. The most common obstacle to implementing inter-municipal collaboration is also lack of resources. Moreover, the overall digital literacy in Finland is at high level among the working age population. The use of the internet and command of the common office software are considered to belong to basic computer literacy.



With regard to their challenges and needs, the most challenging issues from a digital perspective were lack of funding, dependence on old software and availability of skilled labour. While digital literacy in Finland is at a high level among the working-age populations, it is likely that the differences or gaps in skills tend to expand when disruptive technologies are considered. These advanced technologies are completely unfamiliar to many in public service provision

They report that the use of disruptive technologies such as VR/AR were most familiar in the youth and education sectors and were connected to gamified learning or virtual adventures. Yet, only to a limited number of city officials were familiar with other disruptive technologies. New things are developed and tested usually in externally funded development projects. However, testing of novel solutions tend only seldom lead to extended usage period or wide-scale adoption of disruptive technologies. Projects run out of resources or novel technologies are perceived as additional nice-to-haves, but not mandatory technologies helping or replacing the dominant practices within the sector. With regards to procurement, it appears that the use of innovative procurement is rather rare in the city. The reason for the limited application of innovative procurement is the workload it brings along. The current procurement unit structure is not an idea fit for realizing long innovation processes. While the city has a procurement team implementing all procurements centrally to gradually grow procurement competences, disruptive digital technologies were not actively used in the city's procurement processes, but interest in such technologies were expressed.

With regard to the City of Mikkeli's potentials and opportunities, data shows that many of the functions and services of municipalities are eventually organized through procurement. The City of Mikkeli has issued the procurement rules that acknowledge the strategic importance of procurements, and the city is committed to a sustainable growth programme. Therefore, consideration of sustainable development and circular economy are embedded in the city's procurement rules. In addition, when it comes to Miksei Mikkeli, innovative procurement is much easier to apply. The organization is participating in several development projects that are geared to boost innovation. The city's development company has also dedicated project staff who can allocate working time to these processes. A textbook example of an innovative procurement process was the innovation partnership to develop the new environment data platform for the clean tech business platform EcoSairila. The city has a procurement team implementing all procurements centrally to gradually grow procurement competences. Procurement competence is also supported by the procurement expert services in the development company. Training is organized in thematic procurement evenings that are open for both procurers and potential suppliers. The procurement expert is a regional change agent of the national KEINO Competence centre for Sustainable and Innovative public procurement. However, disruptive digital technologies were not actively used in the city's procurement processes, but interest in such technologies were expressed. This can hopefully address the procurement challenges faced by the City.



Other opportunities include the City of Mikkeli's association with multiple network organization delivery modes.

building a digital innovation platform for **public services – Västernorrland (ALAV)**- With regards to the application of the digital solutions, Västernorrland widely use Robotic Process Automation (RPA), Digital solutions such as e-services and other digital technology, but when it comes to the disruptive technologies, Ornskoldsvik municipality use VR in production and AI to a lesser extent. VR is extensively used in production and AI to a lesser extent in experiment and new pilot projects but to a lesser extent.

With regards to the needs and challenges, while Västernorrland has employees with specific roles for digital development, there is a need to have a higher capacity in the operations that can lead to solutions. Organizational structure and organizational culture need to be adapted and improved to deal with new digital transformations.

On another note, an innovation procurement often takes more time and requires more resources than a regular procurement where there are already ready-made solutions on the market. That's why there is a need of external expertise as support.

With regards to the capacity and skills, the municipality has a development unit with specific competencies and roles in digital development within the entire municipal activities. Moreover, Västernorrland has a working methods and strategists (such as digitization strategy, which provide guidance for digital development) at the development unit who monitor the need for digital development within the entire municipal organization. While Västernorrland has employees with specific roles for digital development, there is a need to have a higher capacity in the operations that can lead to solutions. Increase knowledge and awareness among the management team and decision makers is needed to a greater extent.

With regards to the opportunities, municipality of Örnsköldsvik's ambition is to build up a systematic innovation work to strengthen the innovation capacity in the organization. To be able to create new types of solutions, a system is needed for how they generate, capture and prioritize ideas from co-workers. There is great potential for the development and increase of awareness and understanding of disruptive technologies. As a result, Västernorrland develops a capacity via the INNOCAP project to build a digital platform that is aimed at co-workers who want to develop and send ideas about innovative solutions or work based on challenges and problems in the business.

On the other note, ALAV has recently completed a regional digitization project that developed a digital platform for knowledge and experience exchange digitaliseringsguiden.se "digitalization guide" where new existing digital solutions and new solutions are published. SMEs and the business community have a specific entrance on the website and the municipalities are early users of the solutions that SMEs comes up with. ALAV coordinator e-collaboration and digitization council which consists of Västernorrland county municipalities, Ornskoldsvik is an important part of this collaboration. There is regional, national cooperation. E-collaboration and



digitization council provides new skillset. E-collaboration and the Digitization Council and ALAV as coordinator have a systematic collaboration and working methods, especially with use of digitization guide.

Waste Data Hub – Iceland (SASS) -

Waste is managed at the municipal level in Iceland, and in the past years, the number of municipalities in the country has declined from 122 in 2002 to 69 in 2021. There will be even fewer municipalities in the future as government policy aims at having 1000 inhabitants as the minimum size of any municipality. The policy is based on the belief that larger municipalities can serve their residents more efficiently than smaller ones, as they will enjoy some economies of scale. Although Iceland is a well-developed economy and thus similar to many neighbouring countries, three characteristics make international comparison on waste management difficult. First, Iceland is in essence a city-state, with two thirds of the nation residing in the Capital Region. Second, as in other northern countries, lack of infrastructure, long distances and low population density, especially in rural areas, distinguish Iceland from most comparable countries. Third, waste management strategies in most municipalities are influenced by access to affordable hydropower electricity and geothermal energy, with 90% of heated space in Iceland using geothermal energy.

With regards to the application of the digital solutions, SASS needs to track waste data in KG and cost within municipalities. SASS's innovation goal is to implement the Waste data hub to all municipalities in Iceland. First goal is to be able to track the kg and cost/kg for each waste stream from each municipality. Second is to track cost associated to all waste service within the municipality. To achieve these goals, SASS needs to build an API based on the Waste Data Hub system for all the services that waste handlers provide to municipalities. This way they would connect to SASS, and SASS could align and uniform all waste data that comes through the waste handlers billing system to the municipalities.

Opportunities available to SASS is working with municipality leaders and municipality boards for implementation. Working with the appropriate staff for utilization. Moreover, SASS can align all waste data in Iceland to the same naming system. SASS is creating a list that could become the general code for waste in Iceland (and elsewhere) that covers most waste service in Iceland from the viewpoint of the municipalities.

SASS has been in contact with an Icelandic engineer firm that handles the waste contracts for one municipality. The engineer has been introduced to the waste data hub to implement in the waste contract a requirement for the waste handler to hand in data each month based on the naming system in the Waste data hub. If this succeeds and a waste handler agrees to adapt to the Waste data hub, then SASS can open the hub for several others, because in Iceland there are only 3 main waste handlers, and they roughly divide the 64 municipalities here.

With regards to the challenges faced by SASS, lack of know-how and experience on innovation procurement is a significant barrier to innovation procurement. Moreover, Other challenge is related to waste handlers not cooperating and willing to change



their systems to fit SASS's. Other challenge faced by SASS is about possibilities to lose the interest of their network to use the system. On another note, if the waste handlers change their system, they will probably charge the municipality for it. If SASS makes this requirement through the contract, the contract should include cost to compensate the waste handler. This is something that SASS could step in to and help provide funding for, for the municipality to be more willing to put these requirements into their contracts and then eliminate the threat that no one will participate in the bidding because of this requirement.

Due to the lack of good quality historical data, it is difficult for most municipalities to develop good predictions based on past and current situations. Although a few municipalities have received some leeway from the Environment Agency of Iceland, when it comes to waste disposal, it is unclear how that has affected waste management and cost per capita, or if appropriate data is being kept that would allow other municipalities to justify requesting EU extensions. In the absence of state subsidies and EU extensions, Icelandic municipalities also urgently need guidance on formulating their waste management.

4.2 Additional Inputs from the Physical Meeting and Workshop in Letterkenny

During the workshop in Letterkenny, we started by briefly introducing the technologies indicated tentatively as the primary focus areas for the partners through the initial pilot descriptions and the first questionnaire. Then we allowed partners to freely elaborate upon their vision of the pilots based on the information presented in addition to views expressed in the first questionnaire. The critical observations and key discussion points have been gathered and presented below:

building a digital innovation platform for public services (Västernorrland) – ALAV

- Digital innovation platforms will be required for gathering knowledge and allowing the exchange of experiences around innovative technologies.
- Specific business and service areas need to be identified and selected for the platform.
- The platform should support capacity building and communication between stakeholders.
- Relevant assistants will be present to support innovations coaches
- Train the trainer mode should be supported
- No specific technology has been indicated as a base for the platform

Waste data hub (Iceland) – SASS

- Different municipalities have different systems, services and different data models.
- Data integration seems to be a primary issue.
- Smooth User Experience is paramount, it is important that the solution developed is easy to use and useful to offices.
- It is important to support a diverse set of user needs
- Dashboards can be an important component; reporting capability would be useful



- IoT and AI seem like important technology
- RFID is mentioned as the technology already implemented
- Partner is open for broad innovation
- The primary stakeholder for the platform would be municipalities, not citizens.
- Managing contracts might be necessary.

Social innovation led service for decision-making on digital and green transition (Mikkeli) - UH in coordination with Mikkeli

- A platform that allows tracking innovation and where it happens
- GIS technologies are identified as pivotal (like ArcGIS pro)
- Area specialization should be clearly visible with highlights of pre-transition assets
- Stakeholder would be municipalities
- Accessible and easy to use interfaces are important
- Open Data support for documenting and tracking initiatives is considered as important component
- Data Integration, data models might be needed
- Discussed a possibility for 3D visualization in GIS
- Automated classification using AI could be an option

Climate change action monitoring (Donegal) – DCC in coordination with ERNACT

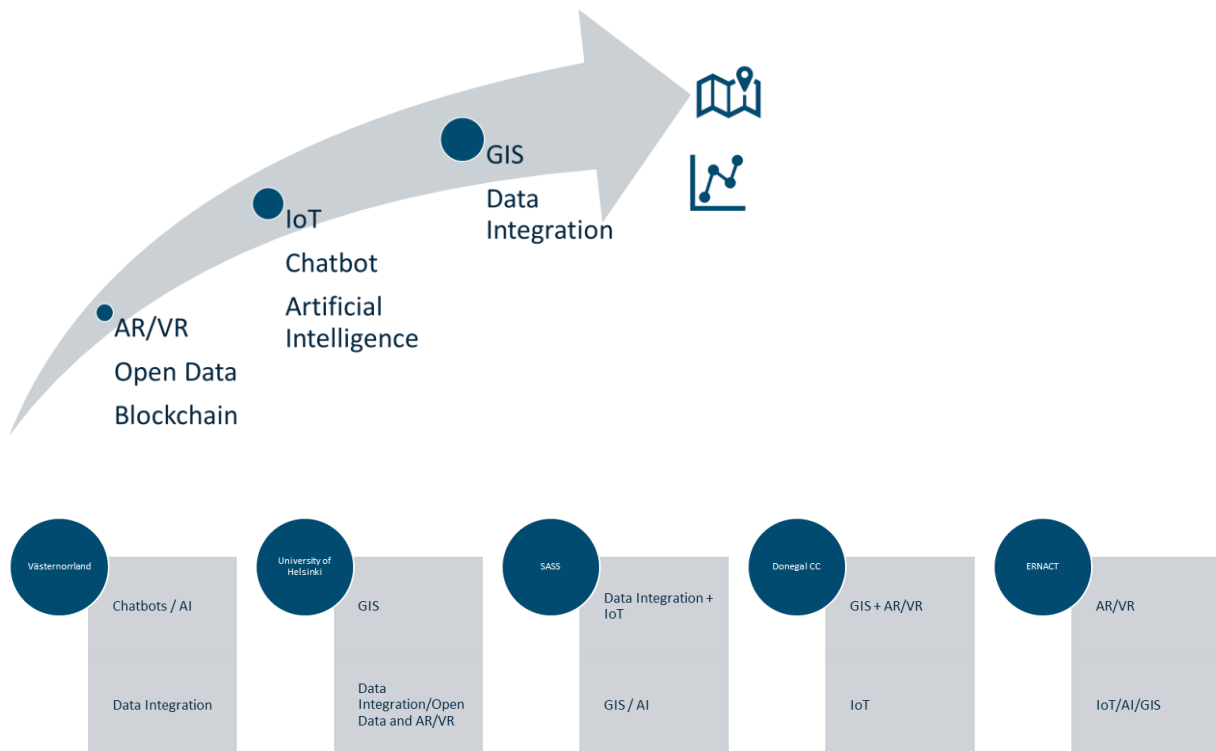
- IoT space seems like the baseline with measurements for climate progressing
- Data Integration with charting
- AI landscape classification/change could be an options
- Landscape change, progression, and coastline erosion visualization is considered as an option
- Immersive VR simulation seems like an option

5 Service Needs Identification

In this section, we combine the results collected from the primary questionnaire and the in-person workshop in Letterkenny with the results of the SWOT analysis and the second questionnaire after delivering the introductory workshops in thematic areas. We looked at the capacity-building requirements and aligned them with the partners' and pilots' related specific strengths and weaknesses elaborated in the SWOT analysis. Most partners have significant organizational strengths and extended structures and networks, but they wish to explore partnerships with industry and academia to deliver sustainable next-gen services. Innovation procurement has been the biggest challenge and opportunity for all the partners. Specifically, partners expect the capacity-building programme to help them better understand emerging technologies with deeper insights into their benefits, costs and practical value to their use cases. This expanded awareness of technologies and methods will allow them to make better decisions and should facilitate the procurement of relevant technologies directly from vendors or in partnership with specific internal or related organizational bodies. While some technical capabilities are present with varying levels from primary through intermediate to advanced in some areas, raising awareness and discovering new solutions and vendors has been pivotal for the consortium.



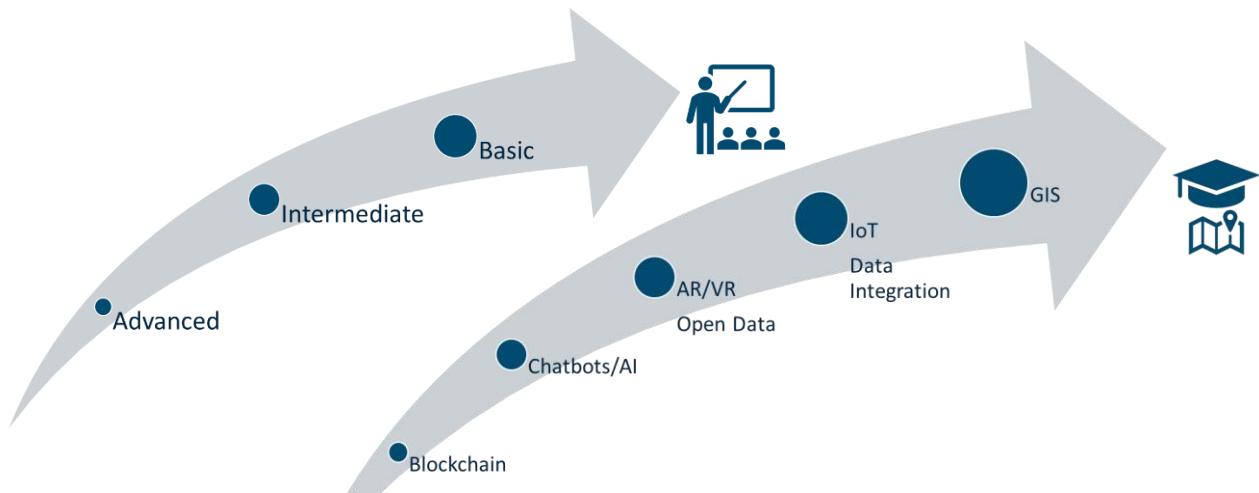
5.1 Priorities



INNOCAP partners have indicated specific priority areas we should address in the capacity-building programme. However, the topics requested to be covered are not distinct and overlap with other technological spaces. For instance, the favoured by most GIS, while heavily linked with data integration matters, often overlaps with AR/VR and AI technologies. GIS is also linked with IoT and Open Data regarding data acquisition and publishing. Therefore our focus in capacity building is steered towards GIS applications but within the context and use of other related emerging technologies and specific combined use cases. Considering that partners indicated in the questionnaires and SWOT analysis relatively low confidence and struggled with finding practical uses of the emerging technologies and overall emerging-tech-know-how capacity, it is important not to restrict or overly focus on one single technology but rather explore more comprehensive use cases. Judging from our experience in running the brief, introductory workshops, we also foresee a need for more exposure to all listed technologies (with the possibility of extending that set) as an important aspect of the capacity-building programme.



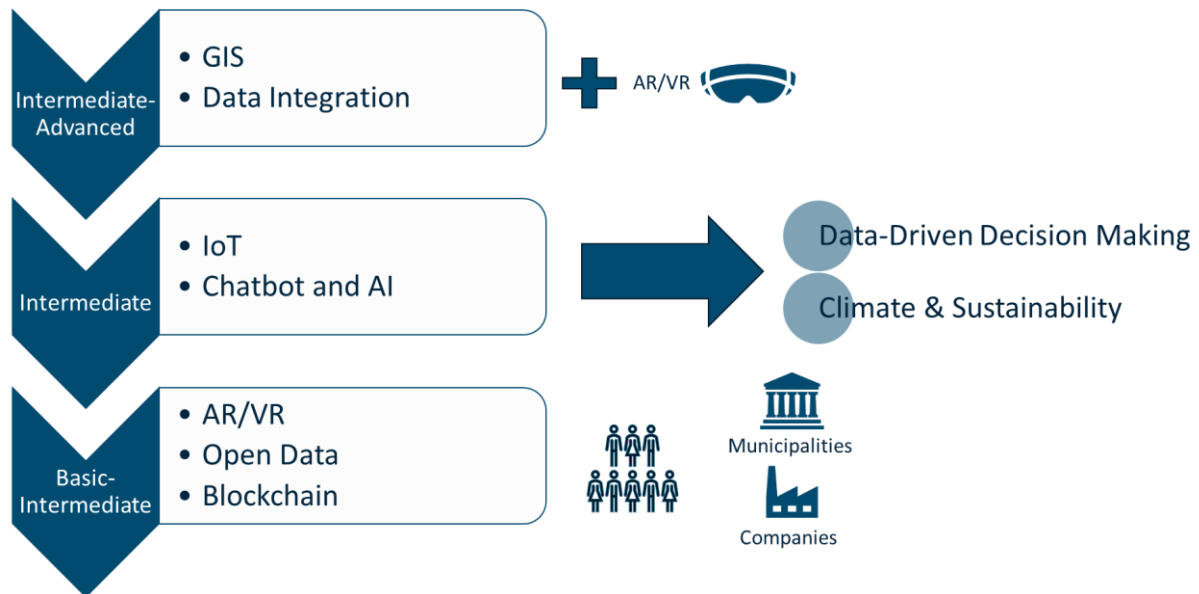
5.2 Skills and Areas of Expertise



The project partners reported mostly basic to intermediate levels of existing skills and current capacity in the particular thematic areas of interest. An important observation is that while GIS has been indicated as a priority theme, GIS is also the best covered in terms of expertise in the consortium, with some partners reporting an advanced level of expertise in that field. Similar situations relate to Data Integration and IoT. That suggests a potential bias in the reported needs and supports our premise to avoid over-focusing on specific tech in the capacity-building programme, emphasizing upskilling and implementing more comprehensive approaches combining multiple technologies in practical use cases. More and broader exposure to emerging technologies and relevant training may help partners to develop new skills and discover new opportunities in the areas that they did not consider viable for practical applications initially. Therefore, it will be important to implement not only vertical training, improving the existing skills and facilitating tentative goals for pilot applications, but also ensure horizontal, vertical capacity-building delivery, allowing for expanding the expertise into new areas. That, for instance, can include specific sessions and workshops on how to harness integrated GIS data coming from different infrastructures and IoT systems while embracing new AR/VR data representations for visualization and engagement.



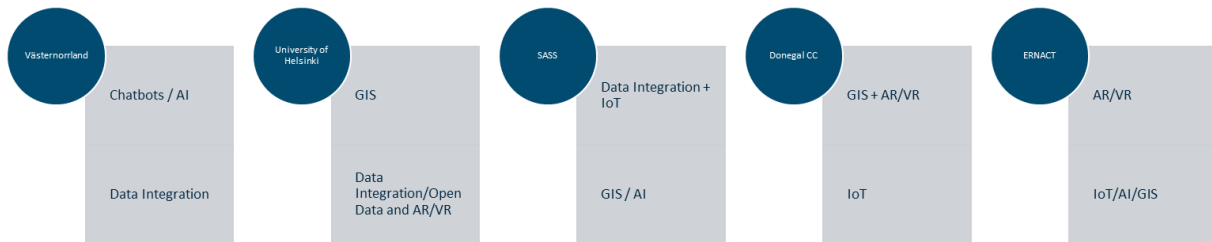
5.3 Partners service needs



Based on the inputs received on the partners' needs and after cross-checking it with specific challenges and opportunities indicated, our service will be delivered in a flexible way in an agile loop with the consortium and extended set of stakeholders. Since the consortium exhibits average intermediate capacity in the GIS and Data Integration area, we will aim at more advanced and more practical than introductory sessions focusing on know-how and hybrid applications combining multiple emerging technologies, such as AR/VR and AI. Those more technical sessions will be supported by additional intermediate and introductory sessions on related emerging methods and technologies to ensure full awareness and affordances of specific solutions. This will also include soft skills training and socio-technical methods relating to better user engagement and may involve elements of gamification. Our comprehensive, hybrid use cases will be aligned with the key goals expressed for the capacity-building programme, which converges around ensuring better, data-driven decision-making, especially in the areas of climate and sustainability. Our use cases will be presented in the context of the end users for the developed pilots which have been declared as mostly municipalities themselves and companies (service vendors).

6 Summary of the Needs Analysis

Now we briefly elaborate upon specific needs per partner.



Building a digital innovation platform for public services (Västernorrland) – ALAV

Key Stakeholders: Municipalities

Service Needs: Training, Education, Sharing Experiences

The partner indicated levels of capacity and skills between intermediate and advanced in all proposed technological areas. Upskilling and broadening the perspectives will be pivotal for the pilot

Technology Needs: Digital innovation Platform, Knowledge Hub , Open Data

Chatbots, AI, and data integration technologies are the preferred emerging technologies to build the platform. The highly versatile platform will serve ideation and prioritizing innovative solutions envisaged by employees who want to address specific challenges in the business.

Investigation Needs: Digital Training and Engagement Capabilities

Important Aspects: Specific Service Areas need to be defined

Waste data hub (Iceland) – SASS

Key Stakeholders: Municipalities, Companies

Service Needs: Dashboards, APIs, Data Integration

The partner indicated specific technological and operational challenges to be addressed by the pilot. That, in particular, includes ensuring that strong partnership with companies is established to deliver better, innovative, yet sustainable waste management services deployed as a standard dashboard. The partner indicated intermediate to essential experience in most of the areas. Relevant awareness sessions that should lead to efficient procurement are pivotal for the service.

Technology Needs: Digital Platform, Common Data Model, IoT and other data streams integrations, GIS, AR/VR

Partners envisage the core technologies to revolve around Data integration, IoT and AI while stressing on dashboards GIS capabilities and AR/VR-driven engagement.

Investigation Needs: Smart data integration, user engagement methods, tools and technologies.



Important Aspects: Accessibility, Ease of Use and Practicality

Social innovation led service for decision-making on digital and green transition (Mikkeli) - UH in coordination with Mikkeli

Key Stakeholders: Municipalities

Service Needs: Dashboards, GIS locator systems, monitoring and tracking of green innovation.

Partner indicated basic yet solid knowledge of the GIS and related tools and dashboards. It will be necessary for the partner to identify specific solutions and vendors that can support efficient monitoring of green innovation. Therefore similarly to the SAAS pilot, relevant awareness sessions and supporting the procurement process will be one of the pillars of the pilot.

Technology Needs: Digital Platform, AI supported GIS, potentially VR as engagement tool, ArcGIS or similar technologies should be leveraged, automatic detection of green efforts

Investigation Needs: GIS data integration and representation, novel tracking methods

Important Aspects: Accessibility, Ease of Use and Practicality

Climate change action monitoring (Donegal) – DCC in coordination with ERNACT

Key Stakeholders: Municipalities, Companies

Service Needs: Dashboards, Maps, Simulation of climate change and sustainability efforts monitoring (such as coastal erosion), automatic detection of sustainability actions.

While the partner has strong skills in GIS and data integration areas, there is an expectation for significant capacity building in the areas of efficient use of emerging AR and VR technologies combined with the latest Artificial intelligence for better monitoring and user engagement.

Technology Needs: Digital Platform, AI-supported GIS, VR/AR Simulations and engagement technologies

The partner is fully open to the wide exploration of emerging technologies and is looking forward to the procurement of cutting-edge technologies and practical developments in the area.

Investigation Needs: Interactive Maps, GIS, IoT Dashboards, AR/VR

Important Aspects: Sustainability of Efforts



7 Conclusions

In this very first yet extensive version of the needs analysis in the project, we included the initial requirements collected from INNOCAP partners through questionnaires, workshops and relevant SWOT analysis forms. The analysis indicated a broad spectrum of needs with overlaps around GIS, data integration and data-driven platforms. Most partners envisage the adaptation of cutting-edge AR and VR technologies supported by the most recent AI tools as an effective solution for better data comprehension and more efficient user engagement and collaboration. From our elaboration, it is clear that the capacity-building program has to start with solid practical support for the pilots in the areas indicated that should lead to specific innovation procurement actions. In parallel, we must ensure strong awareness campaigns for all the indicated technological areas and provide partners with the most up-to-date news about tools and vendors in this incredibly fast progressing technological domain.

We envisage hybrid problem-based workshops and training sessions. Therefore our first capacity-building sessions would be themed with GIS while investigating specific combined use cases of GIS & AI and GIS & AR/VR applications and dashboards with data integration and publication through open data. We observe stronger alignment between SAAS, Donegal and Mikkeli around those use cases, while Västernorrland will also benefit from data & knowledge consolidation, dissemination and engagement aspects for their ideation platform. Further capacity building will take more substantial steps towards ensuring good support for knowledge dashboards innovation procurement. Every capacity-building session will be delivered in 3 stages: 1) Workshops & presentations, including engagements with vendors; 2) Pilot refinement and development; 3) feedback collection and capacity-building process alignment.

Our immediate step includes relevant mapping of the needs gathered in our analysis to specific capabilities of the consortium organizations (especially Insight at University of Galway) and designing specific training scenarios. This will be followed by identifying external organizations and vendors that will be invited to deliver capacity-building sessions.

We envisage the first capacity-building session to be delivered in-person during the consortium meeting in Iceland in September.

This working document will evolve as we will embark on further discussions, including presentations and workshops with specific technologies, methods, and tools as part of designing the capacity-building programme.



Appendix 1 - Survey 1 Questionnaire

Draft ID: fe654e0d-8a1d-43a7-851a-b9191c1fdd0b

Date: 10/07/2023 14:54:30

INNOCAP Project - Needs Analysis Survey

Fields marked with * are mandatory.

Background

* Organization you represent

* Your role in the organization

Does your organization's leadership encourage the use of new tools and technology?

- Yes
 No

* Please describe your innovation goals and objectives

Service/Pilot

* What do you need the service to do/provide? or describe your vision of the service/pilot

* Who are the stakeholders of this service?

* What do you think would be the main benefits coming out from this service/technology?

- operational efficiency
 improved services
 More data driven decision making
 other



* How do you intend to deliver the service?
 (working with community groups, public sector etc.)

What kinds of relationships are essential for you to deliver this service?

Requirements you need to engage

Where do you foresee opportunities?

Where do you foresee challenges?

Needs and Requirements

How aware are you of new tools and technology available to your organization? (Technical Capabilities)

- 1. Not at all aware
- 2
- 3
- 4
- 5 Very aware

* Considering your vision of the service, are there any specific applications or technology you would like to explore?

between 1 and 3 choices

- Virtual Agents
- Decision Management
- Data and Text Analytics
- Machine Learning
- Process Automation
- Open Data and Linked Data
- Blockchain
- Virtual Reality
- Data Platforms (e/g/ crowdsourcing platforms)
- IoT
- Other
- Distributed ledger technology
- Voice assistants
- Deep learning



What do you like about this technology?

* Technical capabilities available to your organization to adopt the digitalized service?

* Capacity/Digital skills available to your organization to adopt the digitalized service?

Feedback

Please provide your feedback, if any

Contact

fatemeh.ahmadizeleti@insight-centre.org



Appendix 2 – Survey 1 Results

Contribution ID: 2592eab6-2c03-4103-a9d7-0333b36b1f8f

Date: 20/02/2023 10:12:44

INNOCAP Project - Needs Analysis Survey

Fields marked with * are mandatory.

Background

* Organization you represent

Donegal County Council

* Your role in the organization

IS Project Leader

Does your organization's leadership encourage the use of new tools and technology?

- Yes
- No

* Please describe your innovation goals and objectives

Our goals are to look at innovative technologies with the IT sector and see if they would benefit the services provided by Donegal County Council.

Service/Pilot

* What do you need the service to do/provide? or describe your vision of the service/pilot

We will developed this service based on the learnings of this project about disruptive technologies during the initial phase of the project.

* Who are the stakeholders of this service?

Information Systems Department and Environmental Services division (potentially the Planning Directorate as well)

* What do you think would be the main benefits coming out from this service/technology?

- operational efficiency
- improved services



- More data driven decision making
- other

* How do you intend to deliver the service?
 (working with community groups, public sector etc.)

Working in collaboration with the Environmental Staff internally in Donegal County Council.

What kinds of relationships are essential for you to deliver this service?

Requirements you need to engage

Where do you foresee opportunities?

The opportunity is developing a services that contributes to the implementation of the Climate Adaptation Plan in some manner which should contribute to the sustainable development of our environment.

Where do you foresee challenges?

Sustainability of a service is always a challenge after a pilot project. Can it be scaled up, can it be adopted as a core method of work. Will there be a budget line to maintain the service etc.

Needs and Requirements

How aware are you of new tools and technology available to your organization? (Technical Capabilities)

- 1. Not at all aware
- 2
- 3
- 4
- 5 Very aware

* Considering your vision of the service, are there any specific applications or technology you would like to explore?

between 1 and 3 choices

- Virtual Agents
- Decision Management
- Data and Text Analytics
- Machine Learning
- Process Automation
- Open Data and Linked Data
- Blockchain
- Virtual Reality
- Data Platforms (e/g/ crowdsourcing platforms)
- IoT
- Other



- Distributed ledger technology
- Voice assistants
- Deep learning

What do you like about this technology?

Potential to add values to existing data, potential to collect data in a large & remote county, potential to develop evidence based decision processes inhouse

* Technical capabilities available to your organization to adopt the digitalized service?

We have a proven track record of adopting and developing innovative solutions in Donegal County Council

* Capacity/Digital skills available to your organization to adopt the digitalized service?

Capacity within the IS Department to adopt digital services, the question is more the human capacity of the target directive to adapt to the potential of new digital service.

Feedback

Please provide your feedback, if any

Contact

fatemeh.ahmadizeleti@insight-centre.org



Contribution ID: c4bdf9c2-b23a-4d1c-a39a-c4296218c70c

Date: 22/02/2023 19:04:47

INNOCAP Project - Needs Analysis Survey

Fields marked with * are mandatory.

Background

* Organization you represent

The municipality of Örnsköldsvik (Association of local authorities, västernorrland lead partner)

* Your role in the organization

Business developer

Does your organization's leadership encourage the use of new tools and technology?

- Yes
 No

* Please describe your innovation goals and objectives

The municipality of Örnsköldsvik's ambition is to build up systematic innovation work to strengthen the innovation capacity in the municipality. We need to develop well-functioning businesses as well as create new and smarter community services.

- We will centre on digital innovation coaches training to skill up on Design Technology (DT) and other type of technologies to support organizations in a better way. In parallel, aim at creating a digital platform or tool for innovative processes where the municipality's employees receive support to explore and develop their ideas and challenges.

Service/Pilot

* What do you need the service to do/provide? or describe your vision of the service/pilot

The service will enable municipality's employees receive support to explore and develop their ideas and challenges.
Strengthen the innovation capacity in the municipality.
Improved service for the residents of Örnsköldsvik municipality.
New ways of thinking and a deeper understanding of what creates value for the residents of Örnsköldsvik municipality
To tackle new society challenges



* Who are the stakeholders of this service?

Municipal activities/municipal organizations.
 Municipal Staff
 The end users are residents of Örnsköldsvik municipality.

* What do you think would be the main benefits coming out from this service/technology?

- operational efficiency
- improved services
- More data driven decision making
- other

* How do you intend to deliver the service?

(working with community groups, public sector etc.)

We will work closely with 1-2 selected businesses, stakeholders, innovations company and INNOCAP partners.
 In close cooperation with the owners of the needs (organization that wants to change the business) and users (the employees).

What kinds of relationships are essential for you to deliver this service?

Requirements you need to engage

The relations with pilot test business areas, relation with stakeholders external expertise and INNOCAP partners (NUIG)

Where do you foresee opportunities?

Innovation capacity building is a top priority for the municipal management and the politics in the municipality.
 Well established among businesses
 Needs identified. Drive a culture reinforcement to create a more innovation-friendly environment.
 To make visible development initiatives

Where do you foresee challenges?

To be able to create space in everyday working life for improvement work and take advantage of employees' ideas
 Limited knowledge in certain areas
 Lack of awareness
 To invest in the business, dare to test and take the time to test

Needs and Requirements

How aware are you of new tools and technology available to your organization? (Technical Capabilities)



- 1. Not at all aware
- 2
- 3
- 4
- 5 Very aware

* Considering your vision of the service, are there any specific applications or technology you would like to explore?

between 1 and 3 choices

- Virtual Agents
- Decision Management
- Data and Text Analytics
- Machine Learning
- Process Automation
- Open Data and Linked Data
- Blockchain
- Virtual Reality
- Data Platforms (e/g/ crowdsourcing platforms)
- IoT
- Other
- Distributed ledger technology
- Voice assistants
- Deep learning

Please specify

In this level of the project we are not able to specify technology. We want to learn more from public link projekt and other DT technology you suggest.

What do you like about this technology?

Not relevant at this level

* Technical capabilities available to your organization to adopt the digitalized service?

We have a digital development unit with various digital competencies
 We have a development department with strategists, e-service developers, business developers who can analyze, evaluate and structure.

Very good knowledge of e-service design within the municipal public sector
 Very good knowlesge of digital websites
 Limited knowledge within Disruptive technology

* Capacity/Digital skills available to your organization to adopt the digitalized service?



Very good knowledge of e-service design within the municipal public sector
Very good knowledge of digital websites
Limited knowledge within Disruptive technology

We have a digital development unit with various digital competencies
We have a development department with strategists, e-service developers, business developers who can analyze, evaluate and structure.

Feedback

Please provide your feedback, if any

This survey is filled by ALAV, västernorrland and our stakeholder municipality Örnköldsvik. The answers are given by Örnköldsvik.

Contact

fatemeh.ahmadizeleti@insight-centre.org



Contribution ID: c9155c2a-3355-4f21-94c5-1bcf2907885b

Date: 16/02/2023 11:18:29

INNOCAP Project - Needs Analysis Survey

Fields marked with * are mandatory.

Background

* Organization you represent

SASS

* Your role in the organization

Specialist

Does your organization's leadership encourage the use of new tools and technology?

- Yes
 No

* Please describe your innovation goals and objectives

To implement the Waste data hub to all municipalities in Iceland. First goal is to be able to track the kg and cost/kg for each waste stream from each municipality. Second is to track cost associated to all waste service within the municipality.

Service/Pilot

* What do you need the service to do/provide? or describe your vision of the service/pilot

Track waste data kg and cost within municipalities

* Who are the stakeholders of this service?

Municipalities, waste service providers

* What do you think would be the main benefits coming out from this service/technology?

- operational efficiency
 improved services
 More data driven decision making



other

* How do you intend to deliver the service?
 (working with community groups, public sector etc.)

Working with municipality leaders and municipality boards for implementation. Working with the appropriate staff for utilization

What kinds of relationships are essential for you to deliver this service?

Requirements you need to engage

Head of municipalities, Ministry of the Environment, Energy and Climate, EPA of Iceland, Waste service providers

Where do you foresee opportunities?

When a municipality is connected they will see better bottlenecks in their waste system and can make better decisions and the waste management of the municipality will be clearer and more efficient. When data is digital we can better adapt to PAYT. And when waste data is digital and sorted from origin we can better create our accurate carbon footprint which is a legal requirement for municipalities in Iceland.

Where do you foresee challenges?

Experience has taught us that we need to create data quality requirements and an API that the service providers adjust to and connect through. This will be a challenge

Needs and Requirements

How aware are you of new tools and technology available to your organization? (Technical Capabilities)

- 1. Not at all aware
- 2
- 3
- 4
- 5 Very aware

* Considering your vision of the service, are there any specific applications or technology you would like to explore?

between 1 and 3 choices

- Virtual Agents
- Decision Management
- Data and Text Analytics
- Machine Learning
- Process Automation
- Open Data and Linked Data
- Blockchain
- Virtual Reality



- Data Platforms (e/g/ crowdsourcing platforms)
- IoT
- Other
- Distributed ledger technology
- Voice assistants
- Deep learning

What do you like about this technology?

Its a huge step forward towards the SMART city framework.

* Technical capabilities available to your organization to adopt the digitalized service?

Funding is the most important aspect. There we can buy service. We have no programing skills which is crucial at this point of the project.

* Capacity/Digital skills available to your organization to adopt the digitalized service?

Electrical engineering, environmental management, business skills and a very strong network.

Feedback

Please provide your feedback, if any

Contact

fatemeh.ahmadizeleti@insight-centre.org



Contribution ID: d7847514-8493-4ad6-8e7e-460751973872
Date: 16/02/2023 08:16:07

INNOCAP Project - Needs Analysis Survey

Fields marked with * are mandatory.

Background

* Organization you represent

University of Helsinki

* Your role in the organization

Senior Researcher

Does your organization's leadership encourage the use of new tools and technology?

- Yes
 No

* Please describe your innovation goals and objectives

In INNOCAP: explore potential GIS-tools, map openly available spatial data that describe the twin transition (digital & green) in the NPA/rural areas and pilot an easy-to-use (probably web-based) GIS-tool/interface for retrieving the mentioned data and showcasing it on a map (e.g. where do digital and green "capabilities and assets" are on the map in a region and how this information could be used in decision-making).

Service/Pilot

* What do you need the service to do/provide? or describe your vision of the service/pilot

Show data related to digital and green transition on a map (at the same time, preferably draws the data from open sources in real time/almost real time).

* Who are the stakeholders of this service?

Decision-makers/developers in municipalities, regional councils, the public (public sector actors that could benefit from "seeing" how the digital and green assets and capabilities are spread around their region).

* What do you think would be the main benefits coming out from this service/technology?

- operational efficiency



- improved services
- More data driven decision making
- other

* How do you intend to deliver the service?
(working with community groups, public sector etc.)

Mainly developing it within the organization (UH). Later, piloting the service with a limited number of municipalities' representatives and collecting feedback for other potential users of the service.

What kinds of relationships are essential for you to deliver this service?

Requirements you need to engage

To explore a set of potential software and select the most potential GIS-tool (web-based?), identify open access data sets (the most demanding task), determine whether data can be "fed" automatically to the tool, pilot the solution with potential users.

Where do you foresee opportunities?

Finding novel data sets that show regions' digital and green transition potentials, visually impressive user-interface, stakeholder engagement in development and piloting.

Where do you foresee challenges?

Potential restrictions of a web-based GIS-tool, availability of relevant open access data, other unpredictable problems with the data.

Needs and Requirements

How aware are you of new tools and technology available to your organization? (Technical Capabilities)

- 1. Not at all aware
- 2
- 3
- 4
- 5 Very aware

* Considering your vision of the service, are there any specific applications or technology you would like to explore?

between 1 and 3 choices

- Virtual Agents
- Decision Management
- Data and Text Analytics
- Machine Learning
- Process Automation
- Open Data and Linked Data
- Blockchain



- Virtual Reality
- Data Platforms (e/g/ crowdsourcing platforms)
- IoT
- Other
- Distributed ledger technology
- Voice assistants
- Deep learning

Please specify

GIS-tools or solutions

What do you like about this technology?

It fits best for solving the problem, visual presentation of data on the map, ability to provide understandable infographics (combine different data to a visual presentation on a map).

* Technical capabilities available to your organization to adopt the digitalized service?

Limited (a social science research unit, some resources in the project to outsource certain functions).

* Capacity/Digital skills available to your organization to adopt the digitalized service?

Moderate (a person hired with a moderate knowledge on geography and digital GIS-tools).

Feedback

Please provide your feedback, if any

Contact

fatemeh.ahmadizeleti@insight-centre.org



Appendix 3 – SWOT Analysis – Data

Digital coaches for innovative public services (Västernorrland) – ALAV

	<p>Opportunities 🌱</p> <p>What opportunities do you have? What trends can you take advantage of?</p> <p>Trust-based governance and management is decided, which is a prerequisite for innovative work.</p> <p>Many businesses are facing major challenges that require new ways of working, awareness is high that we need to make digital transformation.</p> <p>How can your strengths be used?</p> <p>Systematically working with innovation methods, e.g., process management and service design</p>	<p>Threats ⚠️</p> <p>What potential threats do you face? What changes in your industry are troublesome?</p> <p>Political decisions, reduced budget for development work</p> <p>High workload in the businesses</p> <p>Societal challenges such as climate change, aging population, and reduced resources.</p> <p>What threats do your weaknesses expose?</p> <p>The threats make us change our way of thinking and be more innovative.</p>
<p>Strengths 💪</p> <p>What do you do well? What unique resources do you have?</p> <p>The municipality has networks with process leaders that can lead co-creation meetings with innovative methods.</p> <p>The Municipal organisation has experience in working cross functional which creates good conditions for innovation</p> <p>The work has been done to investigate how the organization can support employees' ideas. This can be used as a starting point for creating</p>	<p>Strategies to make use of Opportunities through our Strengths</p> <p>Our operations, with the development department of the municipality at the forefront, actively work with systematized working methods to identify our needs, challenges, and opportunities. To raise awareness of the competencies our employees possess in that work. To bring together the challenges that exist with available solutions thanks to digital technology. This is in close collaboration with higher education institutes and business/SMEs.</p>	<p>Strategies to prevent Threats through our Strengths</p> <p>By identifying them early and connecting the necessary and available resources.</p>
<p>structures that support exploration and innovative work.</p> <p>The innovation & digitalization is priorities of the municipality and is anchored in the leadership</p> <p>We have a development department that consists of competencies such as e-service developers, IT strategists, business developers, website developers, digitization strategists, information security specialist.</p> <p>What do others compliment or praise?</p> <p>Process leader network and innovation and digital coaches are lifted as a good practice.</p>		
<p>Weaknesses? 📉</p> <p>Where is there room for improvement? What resources do you lack?</p> <p>There is a lack of an overall approach, many initiatives that are not synchronized.</p> <p>The management does not drive the issues in a clear way. There is no zeal that pushes on.</p> <p>Uneven level of knowledge in the organization when it comes to innovation and DT.</p> <p>What critiques do you receive?</p> <p>Criticism from within the businesses that there is no management & control that takes clarity around the overall approach.</p>	<p>Strategies to make use of Opportunities to minimize Weaknesses</p> <p>Increase understanding, increase awareness, work actively to raise skills and clearly demonstrate the benefits of new innovations for better community service.</p>	<p>Strategies to minimize the potential dangers lying in sectors where Weaknesses meet Threats</p> <p>We work with risk analyses, quality assurance and raising awareness as well as control chains for management and control at all levels where we can detect and prevent risks in a systematic way.</p>



Waste data hub (Iceland) – SASS

	<p>Opportunities 🌱</p> <p>What opportunities do you have? What trends can you take advantage of?</p> <p>Our opportunities lie in aligning all waste data in Iceland to the same naming system.</p> <p>We need to build an API based on our name system for all the services that waste handlers provide to municipalities. This way they would connect to us, and we could align and uniform all waste data that comes through the waste handlers billing system to the municipalities.</p> <p>How can your strengths be used?</p> <p>We are creating a list that could become the general code for waste in Iceland (and elsewhere) that covers most waste service in Iceland from the viewpoint of the municipalities.</p>	<p>Threats ⚠️</p> <p>What potential threats do you face? What changes in your industry are troublesome?</p> <p>The waste handlers won't cooperate and won't change their systems to fit ours.</p> <p>What threats do your weaknesses expose?</p> <ul style="list-style-type: none"> • That we don't have the full knowledge to follow this project through. • That the process will be too slow so we lose the interest of our network. • That we have made some kind of assumptions that don't represent reality correctly.
<p>Strengths 💪</p> <p>What do you do well? What unique resources do you have?</p> <p>We have the Ministry of the Environment, Energy and Climate, the Icelandic Environmental protection agency (EPA) and several municipalities on board.</p> <p>We have fully financed the project.</p> <p>We have organized waste data, and we have created a database for these data. We have aligned all data to the European waste code (EWC) the WstatR code, and to the Icelandic EPA definition of municipality solid waste.</p> <p>What do others compliment or praise?</p> <p>Our insights on waste data, waste monitoring, and waste management.</p>	<p>Strategies to make use of Opportunities through our Strengths</p> <p>We have recently been in contact with an Icelandic engineer firm that handles the waste contracts for one municipality. The engineer has been introduced to the waste data hub and we see as a step 1. to implement in the waste contract a requirement for the waste handler to hand in data each month based on the naming system in the Waste data hub. If this succeeds and a waste handler agrees to adapt to the Waste data hub, then we can open the hub for several others, because in Iceland there are only 3 main waste handlers, and they roughly divide the 64 municipalities here.</p>	<p>Strategies to prevent Threats through our Strengths</p> <p>If the waste handlers change their system, they will probably charge the municipality for it. The engineer firm said that if we make this requirement through the contract, the contract should include cost to compensate the waste handler. This is something that we could step in to and help provide funding for, for the municipality to be more willing to put these requirements into their contracts and then eliminate the threat that no one will participate in the bidding because of this requirement.</p> <p>To eliminate the threat of lack of knowledge, we hope that this project will help us in understanding what we require from a software house in order for the project to be finalized. And hopefully validate our system.</p>
<p>Weaknesses? 📉</p> <p>Where is there room for improvement? What resources do you lack?</p> <ol style="list-style-type: none"> 1. UX design for the Waste data hub 2. System validation 3. Ongoing system maintenance and upgrade, adjusted to the needs of both municipality, state regulations and waste handlers technical and real life issues. 	<p>Strategies to make use of Opportunities to minimize Weaknesses</p> <p>We are hoping that this project will assist us in the details of buying the service we need.</p>	<p>Strategies to minimize the potential dangers lying in sectors where Weaknesses meet Threats</p> <p>As soon as we get some professional help we will minimize a lot of weaknesses.</p>



Social innovation led service for decision-making on digital and green transition (Mikkeli) - UH in coordination with Mikkeli

	<p>Opportunities 🌱</p> <ul style="list-style-type: none"> • Justified need to find novel solutions and capabilities to advance the twin transition (green & digital) • A strong demand to conceive indicators/proxy indicators to monitor the twin transition • Necessary for decision-makers to understand better where twin transition-related assets and capacities are located 	<p>Threats ⚠️</p> <ul style="list-style-type: none"> • Potentially not enough or suitable, high-quality data mandatory for showing the twin transition on a map • Stakeholders' lack of resources and commitment to piloting the service • GIS-tool license and maintenance costs • Difficult usability of the software
<p>Strengths 📈</p> <ul style="list-style-type: none"> • Background knowledge in similar projects • Moderate GIS skills • Strong research skills and stakeholder cooperation • Moderate resources for outsourcing technical expertise 	<p><i>Strategies to make use of Opportunities through our Strengths</i></p> <ul style="list-style-type: none"> • Use research knowledge to develop new solution for twin transition • Collaboration with the decision-makers by using RDI expertise • Novel technical and data solutions that have not been consider before 	<p><i>Strategies to prevent Threats through our Strengths</i></p> <ul style="list-style-type: none"> • Identify a range of potential low-cost and easy-to-use GIS software to maintain the budget • Involve stakeholders and end-users to develop the service • Take advantage of external experts in developing the service or specifying data needs and sources • Steer the service to novel areas or topics that that have proper data available
<p>Weaknesses? 📉</p> <ul style="list-style-type: none"> • Coding and programming skills • The number of available materials and data sources are unknown • Quality of data is unknown • Limited amount of readily available indicators to capture the twin transition • Uncertainties about how to show concretely the connections between digital and green transition 	<p><i>Strategies to make use of Opportunities to minimize Weaknesses</i></p> <ul style="list-style-type: none"> • Seek actively support and help from the partners and external experts • Tap into the demand factor: The growing need to accelerate the green and digital transition increases the amount of research and data • Exploit stakeholders to provide expertise or data otherwise inaccessible 	<p><i>Strategies to minimize the potential dangers lying in sectors where Weaknesses meet Threats</i></p> <ul style="list-style-type: none"> • Map the baseline of the GIS software and the corresponding expertise requirements • Compile a critical literature review of studies related to the twin transition • Focusing to the most promising areas or topics (narrowing down the task, redefining the work based on accessible data and GIS software)



Climate change action monitoring(Donegal) – DCC in coordination with ERNACT

	<p>Opportunities 🌱</p> <p>What opportunities do you have? What trends can you take advantage of? A willingness to invest in new technologies. Climate action officer is new role in the CoCo. Established Climate Action working group A need within the Climate sector to monitor change Increased funding opportunities for Climate related projects/initiatives Close working relationship with local ATU University Current rollout of Fibre broadband to every premises under the NBP Opportunity to create a single one stop shop warehouse of remotely sensed data that can be analysed using innovative AI techniques to enhance the CoCo decision making processes How can your strengths be used? Through existing networks we can leverage funding opportunities</p>	<p>Threats ⚠️</p> <p>What potential threats do you face? What changes in your industry are troublesome? That any investment in Disruptive Tech is not budgeted for post a Pilot Project Disruptive Technology data is not considered as a valuable asset Lack of network coverage to implement IoT sensors in certain areas. Lack of a Corporate IoT policy in terms of data hosting, reporting, analysis etc Staff changes What threats do your weaknesses expose? Despite a willingness to implement IoT, coverage issues in the targeted areas could scupper any potential project Silo approach can lead to a disjointed approach to IoT implementation where data is not coherent and overall costs escalate and undermine the effectiveness of the data gathering.</p>
<p>Strengths 💪</p> <p>What do you do well? What unique resources do you have? Positive relations with key regional, national, local, EU networks Forward thinking ICT section in CoCo Good track record in participating in and delivering innovative projects Through the Local Community Development Committee, the Local Authority can coordinate a range of interagency and local development groups to develop projects Trialled some IoT and VR applications previously What do others compliment or praise? Investment in ICT related projects Leading GIS section in the country County landscape is renowned for its environmental quality which needs to be protected</p>	<p>Strategies to make use of Opportunities through our Strengths</p> <p>Recent staff post sanctions will create opportunities for Staff in the IS section. Positions in a new Climate Action unit are being advertised. Opportunity to adapt a technology that can help in a large remote county with limited staffing resources to create an environment that's managed in an evidence led manner</p>	<p>Strategies to prevent Threats through our Strengths</p> <p>By working with new Climate action unit, to embed the requirement for budgets to maintain and expand on IoT implementation.</p>
<p>Weaknesses 📉</p> <p>Where is there room for improvement? What resources do you lack? Lack of knowledge of Disruptive Technologies and how they can be successfully used in the Public Sector Underinvestment in the ICT sector Slow rollout of the National Broadband plan in the County Network coverage in remote areas of county. Silo approach to projects What critiques do you receive? Poor coverage in certain areas of county. In relation to network coverage improvements we are at the mercy of 3rd party service providers</p>	<p>Strategies to make use of Opportunities to minimize Weaknesses</p> <p>Imminent appointment of Climate Action officer due The building capacity learning within the INNOCAP project will address any knowledge deficits in the CoCo. The Pilot element of INNOCAP will demonstrate the value of investment in Disruptive tech.</p>	<p>Strategies to minimize the potential dangers lying in sectors where Weaknesses meet Threats</p> <p>Reassure staff that Disruptive Tech is not a threat to their work Change and rotation of staff members within Organisation could lead to knowledge drift within sections and pilot scheme don't develop into mainstream work practices. That policy developed on an IoT evidence basis could be challenged based on some areas falling out of coverage to implement IoT solutions to gather the evidence.</p>



Appendix 4 – Intro Workshops Survey

Save a backup on your local computer (disable if you are using a public/shared computer)

INNOCAP Survey

Fields marked with * are mandatory. ✕

Disclaimer ✕

The European Commission is not responsible for the content of questionnaires created using the EUSurvey service - it remains the sole responsibility of the form creator and manager. The use of EUSurvey service does not imply a recommendation or endorsement, by the European Commission, of the views expressed within them.

Background

* Organisation you represent

Service/Pilot

* What do you need the service to do/provide? What is the gap you are trying to address, and what is the value you try to attain?

200 character(s) minimum

* Who are the stakeholders of this service? Who is your target group?

200 character(s) minimum

* Which technologies, in particular, would be of interest for you to learn more about in the capacity-building programme in relation to your pilot?

- Augmented Reality - AR
- Virtual Reality - VR
- Artificial Intelligence - Chatbots
- Other Artificial Intelligence
- Data Integration
- GIS - Graphical Information Systems
- Blockchain Technologies
- IoT - The Internet of Things
- Open Data and Linked Data

For each technology, please describe what problem are you trying to solve with it and how?



Please Rank The Technologies - which technologies are the most important to you and in what order
 Use drag&drop or the up/down buttons to change the order or accept the initial order.

- ⋮
↑ ↓
 Artificial Intelligence - Chatbots
- ⋮
↑ ↓
 Other Artificial Intelligence
- ⋮
↑ ↓
 Data Integration
- ⋮
↑ ↓
 GIS - Graphical Information Systems
- ⋮
↑ ↓
 Blockchain Technologies
- ⋮
↑ ↓
 IoT - The Internet of Things
- ⋮
↑ ↓
 Open Data and Linked Data
- ⋮
↑ ↓
 Augmented Reality - AR
- ⋮
↑ ↓
 Virtual Reality - VR

If not listed above, please provide the name of the technology or service you would be interested in.

For each technology, what is your current skillset / capacity?

	Advanced	Intermediate	Basic	No Knowledge
*Augmented Reality - AR	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
*Virtual Reality - VR	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
*Artificial Intelligence - Chatbots	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
*Other Artificial Intelligence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
*Data Integration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
*GIS - Geographical Information Systems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
*Blockchain Technologies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
*IoT- The Internet of Things	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
*Open Data and Linked Data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional Technology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* What are the specific skills and experiences you have with the listed technologies?
 200 character(s) minimum

Additional Comments for current skillset/capacity (if any)

* What do you think would be the main benefits coming out from indicated services/technologies?

- operational efficiency
- improved service
- more data-driven decision making
- saving costs
- paving way for new services
- climate & sustainability
- Other

Did you identify specific vendors of the technologies or specific candidate tools or solutions? Please list if identified.

Additional information or feedback



- GIS - Graphical Information Systems
- Blockchain Technologies
- IoT - The Internet of Things
- Open Data and Linked Data

For each technology, please describe what problem are you trying to solve with it and how?

Integrating VR/AR into GIS technologies to visualise rising sea levels effects in a coastal community
 Setting up a Local Authority IoT cloud DB which will host data from Air Quality monitor and other IoT sensors

Please Rank The Technologies - which technologies are the most important to you and in what order

Use drag&drop or the up/down buttons to change the order or [accept the initial order](#).

- ☰ IoT - The Internet of Things
- ☰ Virtual Reality - VR
- ☰ Augmented Reality - AR
- ☰ Data Integration
- ☰ GIS - Graphical Information Systems
- ☰ Artificial Intelligence - Chatbots
- ☰ Other Artificial Intelligence
- ☰ Open Data and Linked Data
- ☰ Blockchain Technologies

If not listed above, please provide the name of the technology or service you would be interested in.

For each technology, what is your current skillset / capacity?

	Advanced	Intermediate	Basic	No Knowledge
* Augmented Reality - AR	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
* Virtual Reality - VR	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
* Artificial Intelligence - Chatbots	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
* Other Artificial Intelligence	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
* Data Integration	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
* GIS - Geographical Information Systems	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
* Blockchain Technologies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>



* IoT- The Internet of Things	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
* Open Data and Linked Data	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional Technology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* What are the specific skills and experiences you have with the listed technologies?

200 character(s) minimum

Donegal County Council is one of the leading local authorities in GIS. We have extensive GIS dataset which could be used in generating AR & VR worlds. We are users of the ESRI GIS Platform <https://donegal.maps.arcgis.com>

We also have trialed IoT devices and have more experience of what not to do from that experience rather than what to do. We have good knowledge of the various IoT network options available in Donegal and a good working relationship with the Wisar Lab in ATU.

We have implemented AR technology in the county museum as part of a EU project but we would like to implement this in the field along with VR.

We are participating in a Capacity Building Interreg project on the use of AI for better public services.

We have participated in the EMERGREEN project where we saw the development of the RIA Chatbot for Derry city and Strabane District council.

Additional Comments for current skillset/capacity (if any)

* What do you think would be the main benefits coming out from indicated services/technologies?

- operational efficiency
- improved service
- more data-driven decision making
- saving costs
- paving way for new services
- climate & sustainability
- Other

Did you identify specific vendors of the technologies or specific candidate tools or solutions? Please list if identified.

On our previous pilot of IoT devices we contracted Danalto after a procurement process.

Additional information or feedback

Whilst we were lured into the general chat about cheap and easy to install IoT sensors, when we went to tender the process was anything but cheap and easy, and the installation costs were expensive and elaborate. Also the ongoing data maintenance costs were prohibitive. Sensor shelf life was not what was advertised and sustainability needs to be factored into any project.



Contribution ID: 4233087c-4f5c-4751-9b4e-3a067a90347b
Date: 18/06/2023 19:01:14

INNOCAP Survey

Fields marked with * are mandatory.

Background

* Organisation you represent

University of Helsinki

Service/Pilot

* What do you need the service to do/provide? What is the gap you are trying to address, and what is the value you try to attain?

200 character(s) minimum

To show twin transition-related (digital & green) assets and capabilities on a map. The need for twin transition is increasingly emphasised by numerous organisations (from local to EU -levels) and overarching transition goals are added to regional strategies.

However, it is rather unclear "what" is transitioning to "where" and how to identify/show/manage the transition-related assets and capabilities on a regional level (e.g. the gap).

We try to identify, locate and show these assets and capabilities on a map (as well as to show whether green and digital transition assets are located on same region/differences between regions/transnational differences) to advance regional capacity building (not only vague "transition talk" without substance) and competitive management of these transitions within the regions (e.g. the value).

* Who are the stakeholders of this service? Who is your target group?

200 character(s) minimum

Public sector organisations (municipalities, cities, regional councils and their relevant sectors). To an extent also companies within a region (to create novel green+digital collaborations) and NGO's.

* Which technologies, in particular, would be of interest for you to learn more about in the capacity-building programme in relation to your pilot?

- Augmented Reality - AR
- Virtual Reality - VR
- Artificial Intelligence - Chatbots
- Other Artificial Intelligence



- Data Integration
- GIS - Graphical Information Systems
- Blockchain Technologies
- IoT - The Internet of Things
- Open Data and Linked Data

For each technology, please describe what problem are you trying to solve with it and how?

GIS is the most important. How to show above-mentioned stuff in a practical and easy-to-understand way to the key stakeholders on a map? To show the twin transition assets and capabilities on a map need open and linked GIS-data. Data integration could be useful for example in cases where we need to show data from public databases/sources in our GIS-based service. VR solutions could be interesting approach to communicate the results to stakeholders.

However and obviously, GIS and open/linked data are the most important for us. Data integration and VR are secondary.

Please Rank The Technologies - which technologies are the most important to you and in what order

Use drag&drop or the up/down buttons to change the order or [accept the initial order](#).

- GIS - Graphical Information Systems
- Open Data and Linked Data
- Data Integration
- Virtual Reality - VR
- Other Artificial Intelligence
- Augmented Reality - AR
- IoT - The Internet of Things
- Artificial Intelligence - Chatbots
- Blockchain Technologies

If not listed above, please provide the name of the technology or service you would be interested in.

The most important are GIS and data-related solutions. At least for now in the beginning of the project. We are interested in VR. It would be interesting to test communicating the result with VR technologies.

For each technology, what is your current skillset / capacity?

	Advanced	Intermediate	Basic	No Knowledge
* Augmented Reality - AR	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
* Virtual Reality - VR	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>



* Artificial Intelligence - Chatbots	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
* Other Artificial Intelligence	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
* Data Integration	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
* GIS - Geographical Information Systems	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
* Blockchain Technologies	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
* IoT- The Internet of Things	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
* Open Data and Linked Data	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Additional Technology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* What are the specific skills and experiences you have with the listed technologies?

200 character(s) minimum

With "basic" listed above, we mean that we know the operating logics and know how to use the basic applications. So, we "know" them, but cannot "code" them. Anni is educated as a geographer and has an intermediate skills with the most common GIS-software. We have already identified a set of suitable GIS-software and now going through potential data sources (public, open access).

Additional Comments for current skillset/capacity (if any)

We are now just exploring potential software and data sets. Also, our general aim is quite clear, but we are not able right now (yet) ask well-defined technological questions or formulate potential challenges that needs to be solved. However, these will pop-up later in the project. So, any information of potentials/challenges /known caveats related to GIS-software and (more so) to open access spatial data would be beneficial for us. So that we could identify as early as possible the "known unknowns".

* What do you think would be the main benefits coming out from indicated services/technologies?

- operational efficiency
- improved service
- more data-driven decision making
- saving costs
- paving way for new services
- climate & sustainability
- Other

Did you identify specific vendors of the technologies or specific candidate tools or solutions? Please list if identified.

See our tech report about the potential GIS-software. The solution needs to be open access, quite easy-to-use and maintain, rather cheap and have "enough" applications/options for showing the twin transition-related matters on a map. We are now leaning towards QGIS (any comments or suggestions for potential GIS-software or open access databases describing green and digital transition would be nice!).

Additional information or feedback



Novel tech presentations were great - we learned a lot, thanks!

Contact

[Contact Form](#)



Contribution ID: 68801241-495f-4aec-8da1-7296342a3585

Date: 15/06/2023 10:58:23

INNOCAP Survey

Fields marked with * are mandatory.

Background

* Organisation you represent

ERNACT

Service/Pilot

* What do you need the service to do/provide? What is the gap you are trying to address, and what is the value you try to attain?

200 character(s) minimum

We don't have a role delivering any service but are very interested in the introduction of disruptive technologies in public service provision. An area of particular interest are digital twins for spatial planning. We provide this input in case there is a possibility to learn more. One interesting aspect is to see the possibilities to engage and involve final users into immersive experiences where they can input into new planning scenarios created to get their feedback.

* Who are the stakeholders of this service? Who is your target group?

200 character(s) minimum

The main stakeholders would be the planners in charge of the specific area to be developed. Also the citizens and businesses that would be affected by the development of that new development area. The idea is to open more attractive and effective ways to engage with the final recipients of the service to better direct the investments into meaningful actions responding to their needs.

* Which technologies, in particular, would be of interest for you to learn more about in the capacity-building programme in relation to your pilot?

- Augmented Reality - AR
- Virtual Reality - VR
- Artificial Intelligence - Chatbots
- Other Artificial Intelligence
- Data Integration
- GIS - Graphical Information Systems
- Blockchain Technologies



- IoT - The Internet of Things
- Open Data and Linked Data

For each technology, please describe what problem are you trying to solve with it and how?

- AR and VR would help to create more immersive and visual scenarios for the final users to provide feedback
- IoT could help to monitor real data that could be used as input for planning new development actions (i.e. traffic and people flows, rain intensity to detect flooding areas, etc)
- AI would help to make predictions on the possible scenarios analysing data gathered
- GIS would assist in presenting geographical data

Please Rank The Technologies - which technologies are the most important to you and in what order

Use drag&drop or the up/down buttons to change the order or [accept the initial order](#).

☰ Other Artificial Intelligence
☰ IoT - The Internet of Things
☰ Augmented Reality - AR
☰ Virtual Reality - VR
☰ GIS - Graphical Information Systems
☰ Data Integration
☰ Open Data and Linked Data
☰ Artificial Intelligence - Chatbots
☰ Blockchain Technologies

If not listed above, please provide the name of the technology or service you would be interested in.

For each technology, what is your current skillset / capacity?

	Advanced	Intermediate	Basic	No Knowledge
* Augmented Reality - AR	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
* Virtual Reality - VR	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
* Artificial Intelligence - Chatbots	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
* Other Artificial Intelligence	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
* Data Integration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
* GIS - Geographical Information Systems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>



* Blockchain Technologies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
* IoT- The Internet of Things	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
* Open Data and Linked Data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Additional Technology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* What are the specific skills and experiences you have with the listed technologies?

200 character(s) minimum

In the case of VR/AR I've been user of several solutions. Also know how to create AR experiences with tools like ARWay. Basis knowledge about how AI chatbots and other AI applications work. The same with IoT, basic knowledge of IoT powered services.

Additional Comments for current skillset/capacity (if any)

* What do you think would be the main benefits coming out from indicated services/technologies?

- operational efficiency
- improved service
- more data-driven decision making
- saving costs
- paving way for new services
- climate & sustainability
- Other

Did you identify specific vendors of the technologies or specific candidate tools or solutions? Please list if identified.

ARWay, ESRI

Additional information or feedback

Contact

[Contact Form](#)



Contribution ID: b78516bf-0367-4bff-b5b9-840cb775a9e2

Date: 20/06/2023 14:42:17

INNOCAP Survey

Fields marked with * are mandatory.

Background

* Organisation you represent

The municipality of Örnköldsvik (Association of local authorities, västernorrland, partner)

Service/Pilot

* What do you need the service to do/provide? What is the gap you are trying to address, and what is the value you try to attain?

200 character(s) minimum

- To be able to create new types of solutions, a system is needed for how we generate, capture and prioritize ideas. Therefore, we want to build a digital platform that is aimed at employees who want to develop ideas or work based on challenges and problems in the business.
- The service will enable municipality's employees receive support to explore and develop their ideas and challenges.
- Strengthen the innovation capacity in the municipality.
- New ways of thinking and a deeper understanding of what creates value for the residents of Örnköldsvik municipality
- To tackle new society challenges

* Who are the stakeholders of this service? Who is your target group?

200 character(s) minimum

To be able to create space in everyday working life for improvement work and take advantage of employees ideas for this are the stakeholders:
 Municipal activities
 Municipal staff
 Head of municipal organisations
 Innovation leader
 Business developer and strategist

* Which technologies, in particular, would be of interest for you to learn more about in the capacity-building programme in relation to your pilot?



- Augmented Reality - AR
- Virtual Reality - VR
- Artificial Intelligence - Chatbots
- Other Artificial Intelligence
- Data Integration
- GIS - Graphical Information Systems
- Blockchain Technologies
- IoT - The Internet of Things
- Open Data and Linked Data

For each technology, please describe what problem are you trying to solve with it and how?

The overall idea is to be able to create new types of solutions, we need a system for how we generate, capture and prioritize ideas. Therefore, we want to build a digital platform that is aimed at employees who want to develop ideas or work based on challenges and problems in the business.

Of the above-mentioned technologies, the most relevant ones are below with a description of what we want to use them for

AI Chatbot and AI (can help employees submit ideas, help if there is a solution, vary the uniqueness.

Data integration can help better integration solutions for a better works flow.

RPA automation/process engine can help to monitor flow and communicates information quickly and easily.

Please Rank The Technologies - which technologies are the most important to you and in what order

Use drag&drop or the up/down buttons to change the order or [accept the initial order](#).

Artificial Intelligence - Chatbots

Other Artificial Intelligence

Data Integration

Blockchain Technologies

Open Data and Linked Data

GIS - Graphical Information Systems

IoT - The Internet of Things

Augmented Reality - AR

Virtual Reality - VR

If not listed above, please provide the name of the technology or service you would be interested in.

Not relevant for the pilot but one of the important interests needed for innovations is for example; Identifikation (digital identitet), IAM identity and access management



For each technology, what is your current skillset / capacity?

	Advanced	Intermediate	Basic	No Knowledge
* Augmented Reality - AR	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
* Virtual Reality - VR	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
* Artificial Intelligence - Chatbots	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
* Other Artificial Intelligence	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
* Data Integration	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
* GIS - Geographical Information Systems	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
* Blockchain Technologies	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
* IoT- The Internet of Things	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
* Open Data and Linked Data	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Additional Technology	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

* What are the specific skills and experiences you have with the listed technologies?

200 character(s) minimum

We have a digital development department with various digital competencies
 We have a development department with strategists, e-service developers, business developers who can analyze, evaluate and structure.
 Very good knowledge of e-service design within the municipal public sector
 Very good knowledge of digital websites
 Limited knowledge within Disruptive technology

Additional Comments for current skillset/capacity (if any)

* What do you think would be the main benefits coming out from indicated services/technologies?

- operational efficiency
- improved service
- more data-driven decision making
- saving costs
- paving way for new services
- climate & sustainability
- Other

Did you identify specific vendors of the technologies or specific candidate tools or solutions? Please list if identified.



Additional information or feedback

Regarding the last question about benefits coming out of our platform/service we would like to choose all of the choices but its not possible. To consider for next time is to open up to several choices for question of that type of character.

Contact

[Contact Form](#)



Organisation you represent	What do you need the service to do/provide? What is the gap you are trying to address, and what is the value you try to attain?	Who are the stakeholders of this service? Who is your target group?	Which technologies, in particular, would be of interest for you to learn more about in the capacity building programme in relation to your pilot?	For each technology, please describe what problem are you trying to solve with it and how?	Please Rank The Technologies - which technologies are the most important to you and in what order	If not listed above, please provide the name of the technology or service you would be interested in.	For each technology, what is your current skillset / capacity? Augmented Reality - AR	For each technology, what is your current skillset / capacity? Virtual Reality - VR	For each technology, what is your current skillset / capacity? Artificial Intelligence Chatbots	For each technology, what is your current skillset / capacity? Other Artificial Intelligence	For each technology, what is your current skillset / capacity? Data Integration	For each technology, what is your current skillset / capacity? GIS - Geographical Information Systems	For each technology, what is your current skillset / capacity? Blockchain Technologies	For each technology, what is your current skillset / capacity? IoT - The Internet of Things	For each technology, what is your current skillset / capacity? Open Data and Linked Data	For each technology, what is your current skillset / capacity? Additional Technology	What are the specific skills and experiences you have for current technologies? With the listed technologies?	Additional Comments (if any)	What do you think would be the main benefits coming out from indicated services/technologies?	Did you identify specific vendors of the technologies or specific candidate tools or solutions? Please list if identified.	Additional information or feedback
The municipality of Omskósdvök (Association of local authorities, vatermynd, partner)	- To be able to create new types of solutions, a system is needed for how we generate, capture and prioritize ideas. Therefore, we want to build a digital platform that is aimed at employees who want to develop ideas or work based on challenges and problems in the business. - The service will enable municipality employees receive support to explore and develop their ideas and challenges. - Strengthen the innovation capacity in the municipality. - New ways of thinking and a deeper understanding of what creates value for the residents of Omskósdvök municipality. - To tackle new society challenges (digital & green) assets and capabilities on a map. The need for twin transition is increasingly emphasized by numerous organisations, from local to EU-levels and overarching transition goals are added to regional strategies. However, it is rather unclear "what" is transitioning to "where" and how to identify/show/manage the transition-related assets and capabilities on a regional level (e.g. the gap). We try to identify, locate and show these assets and capabilities on a map (as well as to show whether green and digital transition assets are located on same regions/transition differences between regions/transition differences) to enhance regional capacity building (not only vague "transition talk" without substance) and competitive management of these green/digital transitions within the regions (e.g. the value).	To be able to create spaces in everyday working life for improvement work and take advantage of employees ideas for this are the stakeholders: Municipal staff Head of municipal organisations Innovation leader Business developer and strategist	Artificial Intelligence - Chatbots Other Artificial Intelligence Data Integration Blockchain Technologies Open Data and Linked Data	The overall idea is to be able to create new types of solutions, we need a system for how we generate, capture and prioritize ideas. Therefore, we want to build a digital platform that is aimed at employees who want to develop ideas or work based on challenges and problems in the business. Of the above-mentioned technologies, the most relevant ones are below with a description of what we want to use them for: AI Chatbots and AI learn help employees submit ideas, help if there is a solution, vary the uniqueness. Data integration can help better integration solutions for a better works flow. RPA automation/process engine can help to monitor flow and communicate information quality and safety.	1. Artificial Intelligence - Chatbots 2. Other Artificial Intelligence 3. Data Integration 4. Blockchain Technologies 5. Open Data and Linked Data 6. GIS - Geographical Information Systems 7. Virtual Reality - VR 8. Augmented Reality - AR	Not relevant for the pilot but one of the important interests needed for innovations is for example, identification (digital identity), IAM identity and access management.	Intermediate	Intermediate	Intermediate	Advanced	Advanced	Intermediate	Advanced	Intermediate	Intermediate	Intermediate	We have a digital development department with various digital competencies. We have a development department with engineers, e-service developers, business developers who can analyse, evaluate and structure. Very good knowledge of e-service design within the municipal public sector. Very good knowledge of digital webtools. Limited knowledge within disruptive technology.		Regarding the last question about benefits coming out of our pilot/innovation we would like to choose all of the choices but it is not possible. To consider for next time is to open up to several choices for question of the type of character.		
University of Helsinki		Public sector organisations (municipalities, cities, regional councils and their relevant sectors). To an extent also companies within a region (to create new green/digital collaborations) and NGOs's.	Virtual Reality - VR Data Integration GIS Graphical Information Systems Open Data and Linked Data	GIS is the most important. How to show above-mentioned stuff in a practical and easy-to-understand way to the key stakeholders on a map? To show the twin transition assets and capabilities on a map need open and linked GIS-data. Data integration could be useful for examples in cases where we need to show data from public databases/sources in our GIS-based service. VR solutions could be interesting approach to communicate the results to stakeholders. However and obviously, GIS and open/linked data are the most important for us. Data integration and VR are secondary.	1. GIS - Geographical Information Systems; Open Data and Linked Data; Data Integration; Virtual Reality - VR; Other Artificial Intelligence; Augmented Reality - AR; IoT - The Internet of Things; Artificial Intelligence Chatbots; Blockchain Technologies	The most important are GIS and data-related solutions. At least for now in the beginning of the project. We are interested in VR. It would be interesting to test communicating the issue with VR technologies.	Basic	Basic	Basic	Basic	Basic	Intermediate	Basic	Basic	Basic	Basic	With "basic" listed alone, we mean that we know the operating logics and know how to use the basic applications. So, we "know" them, but cannot "cook" them. Any info indicated as a geographer and has an intermediate skills with GIS-software and software. We have already identified a few access spatial data of suitable GIS-software and now going through potential identify as early as possible the "known unknowns".	We are now just exploring potential software and data sets. Also, our general aim is quite clear, but we are not able right now (yet) ask well-defined technological questions or formulate potential challenges that needs to be solved. However, these will pop-up later in the project. So, any information of potential challenges/needs related to GIS-software and software, we have more so to test open access spatial data would be beneficial for us. So that we could go through potential identify as early as possible the "known unknowns".	See our tech report about the potential GIS software. The solution needs to be open access, quite easy-to-use and maintain, rather cheap and have "enough" applications/options for showing the twin transition-related matters on a map. We are now learning towards GIS (any comments or suggestions for potential GIS-software or open access databases describing green and digital transition would be nice!).		



Appendix 6 – Workshops 1, 2 and 3 Slides

A World Leading SFI Research Centre



Science Foundation Ireland For what's next

INNOCAP Workshop 1 Engagement 2D & 3D/VR AR Navigation

Dr Lukasz Porwol and Dr Fatemeh Ahmadi Zeleti

Insight



SFI RESEARCH CENTRE FOR DATA ANALYTICS

HOST INSTITUTIONS



PARTNER INSTITUTIONS

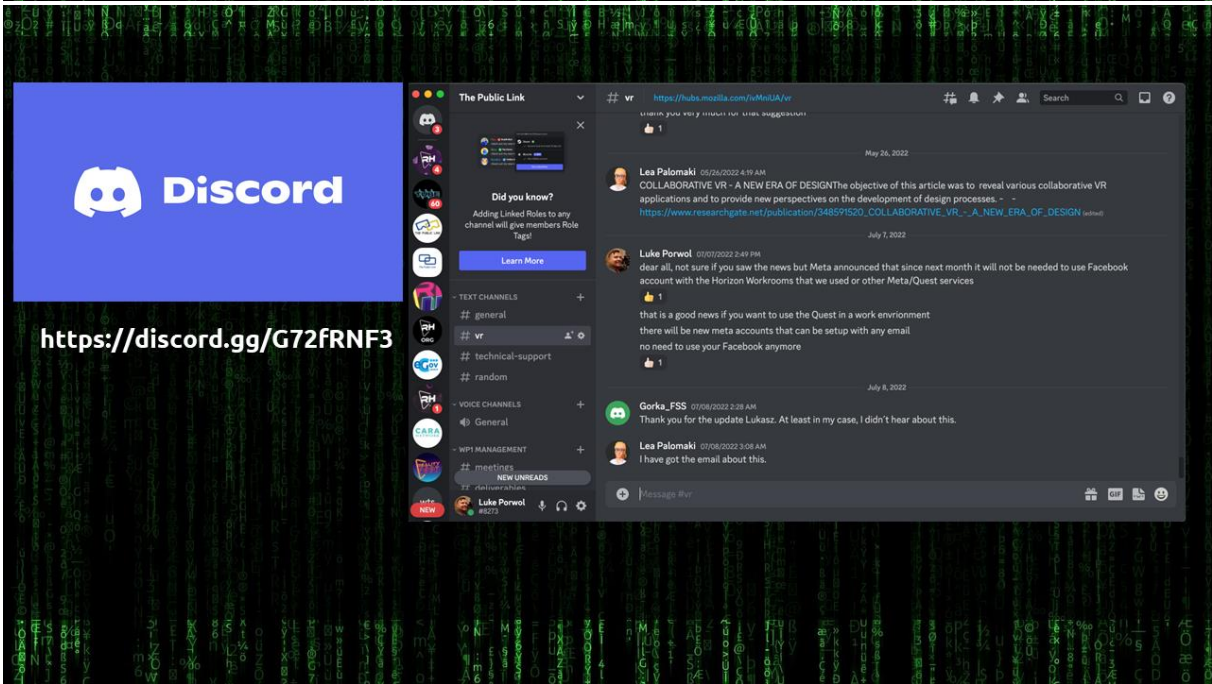
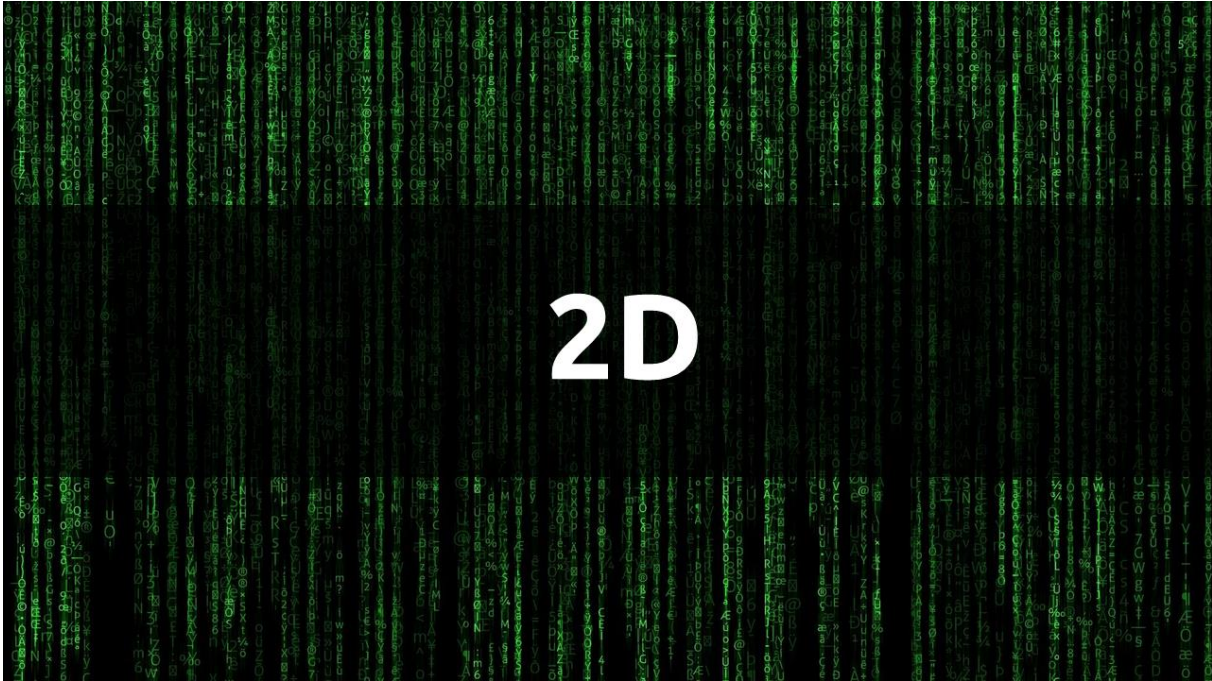


POWERED BY



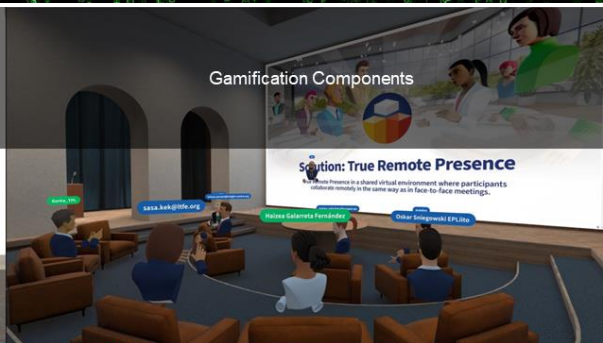
Engagement needs efficient communication and interactivity

A background graphic consisting of vertical columns of green binary code (0s and 1s) on a black background, creating a digital rain effect.





3D/VR



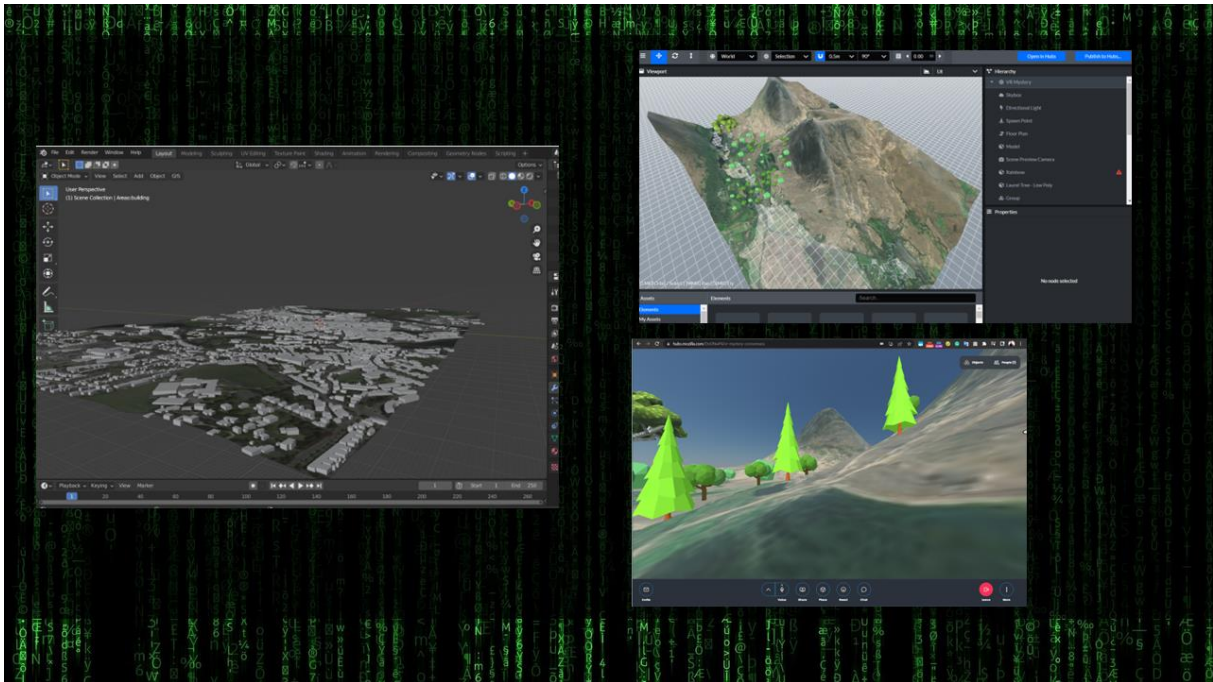


hubs by mozilla

<https://hubs.mozilla.com/jsrXTPk/innocap/>



VR GIS pipeline



Quality VR



ARway.ai


Navigation & Wayfinding

Create robust AR navigation with accurate positioning, digital directory, turn-by-turn, and optimized routes.



<https://youtu.be/7xFrdeNTR4>

VR 360



VR/2D: 360 Video
<https://www.youtube.com/watch?v=PG35FEzkd0&t=153s>
<https://www.youtube.com/watch?v=yxrPJCzvd&t=112s>
<https://www.youtube.com/watch?v=koL7svg1mT4&t=58s>
<https://www.youtube.com/watch?v=teUsQZObGCc>

AR/VR – Polycam, Apple Roomplan API



METAVERSE IS COMING





INNOCAP

Building public sector innovation capacity towards digital-driven NPA communities

Workshop
9th May 2023

Interreg  Co-funded by the European Union

Northern Periphery and Arctic

INNOCAP

Conversational Agents

RIA case



Chatbots

- Conversational agents are software applications that communicate with a human using either spoken or written natural language [1].
- Chatbots are a type of conversational agents used in a wide range of domains [2].
- Due to the demand for better customer service, the increased use of messaging applications, advances in natural language processing techniques, and the availability of platforms to support their implementation, chatbots have become popular in the public service domain [3,4]
- In this context, chatbots can reduce the administrative burden and allow citizens to communicate with the government in their everyday natural language [5]

[1] S. Mallios and N. Bourbakis, "A survey on human machine dialogue systems" *IISA 2016 - 7th Int. Conf. Information, Intell. Syst. Appl.*, 2016, doi: 10.1109/IISA-2016.7785371.
 [2] A. Rapp, L. Curti, and A. Boldi, "The human side of human-chatbot interaction: A systematic literature review of ten years of research on text-based chatbots," *Int. J. Hum. Comput. Stud.*, vol. 151, no. January, p. 102630, 2021, doi: 10.1016/j.ijhcs.2021.102630.
 [3] Y. Petriv, R. Erlenheim, V. Tsap, I. Pappel, and D. Drabsheim, *Designing Effective Chatbot Solutions for the Public Sector: A Case Study from Ukraine* vol. 1135 CCIS. Springer International Publishing, 2020.
 [4] L. C. Klopferstein, S. Delprioni, S. Malatini, and A. Bogliolo, "The Rise of Bots," pp. 555-566, 2017, doi: 10.1145/3064663.3064672.
 [5] A. Andreoussopoulou, N. Karapaplidis, E. Loukis, and Y. Charalabidis, "Transforming the communication between citizens and government through AI-guided chatbots," *Gov. Inf. Q.*, vol. 36, no. 2, pp. 355-367, 2019, doi: 10.1016/j.giq.2018.10.001.

Impact and Benefits

- High quality customer service and improvement in service efficiency
- Use of AI technology enables staff to take on more "value-add" tasks
- Sustainability agenda:
 - Opportunity to educate and improve environmental awareness
 - "nudge" citizen behaviours
 - Creating Public Value



RIA



RIA is the Derry City and Strabane District Council Recycling Information Assistant

RIA was created to reduce the number of phone call from the citizens looking for the basic information.

It can provide the answers in the field of:

- Recycling
- Bin content
- Bin's collection days
- Recycling center's locations
- Service management



How do you imagine the process of creating a chatbot?





Development Challenges

- Scarce, messy and unstructured data
- Information is dynamic
- Partners have no computer science background, but they possess the information
- Wide variety of end users (public service)
- Pandemic! → no focus groups!
How do we test now?



Approach

- User-centred design techniques to ensure that any technology developed in the project had citizens' needs set as the top priority;
- Agile development process, 10 iterations of technology releases in close collaboration with our stakeholders;
- Every cycle was initiated with requirements' analysis and finalised with relevant evaluation by our users in the form of dedicated focus groups.



Building a knowledge base

Group potential user messages by their **intent**

- intent:affirm**
- yes
 - of course
 - sure
 - yeah
 - ok
 - Cool
 - go for it
 - Yeahyy

- intent:greet**
- Hi
 - Hey
 - Hi bot
 - Hello
 - Good morning
 - Hi again
 - Hello there

- intent:ask_bin_collection**
- When are my bins going to be collected?
 - I want to know more about bins collection
 - Can you tell me the bins collection schedule for my neighbourhood?
 - ...
 - What's the story about my bins?

Chatbot behaviour template

For each intent, we asked them to fill the following form:

General description:

Specific data to gather from the user:.....

Specific external service the chatbot should communicate with:.....

Preconditions:.....

Postconditions:.....

Alternative flow:



Example 1: *ask_bin_collection* intent

General description: the chatbot should inform the user about the bins collection schedule at its house or neighbourhood.

Specific data to gather from the user:

- **Address:** user address

Specific external service the chatbot should communicate with:

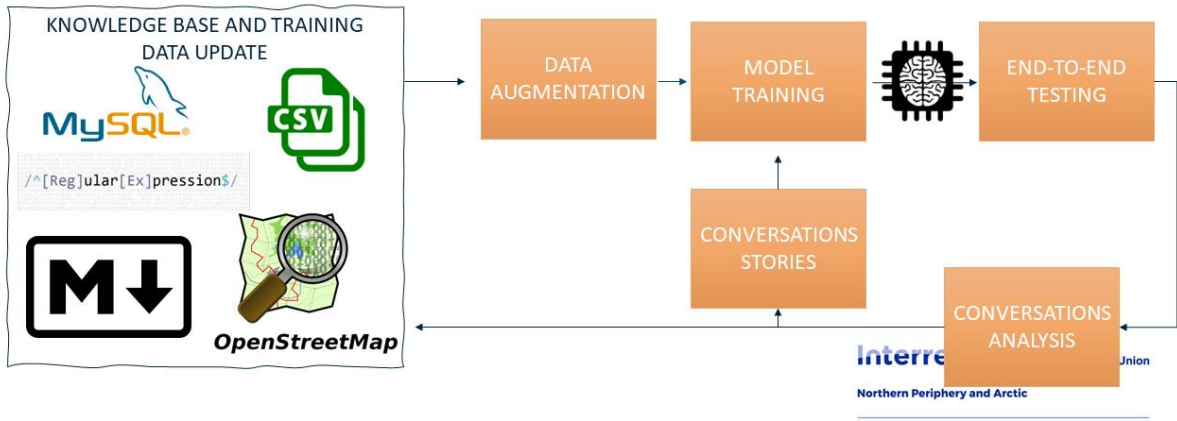
- **Barna Recycling:** the bot needs to query Barna Recycling API in order to get the information about the bins collection for the address introduced by the user.

Preconditions: no preconditions.

Postconditions: the user is informed about the bins collection at its place, including date and time.

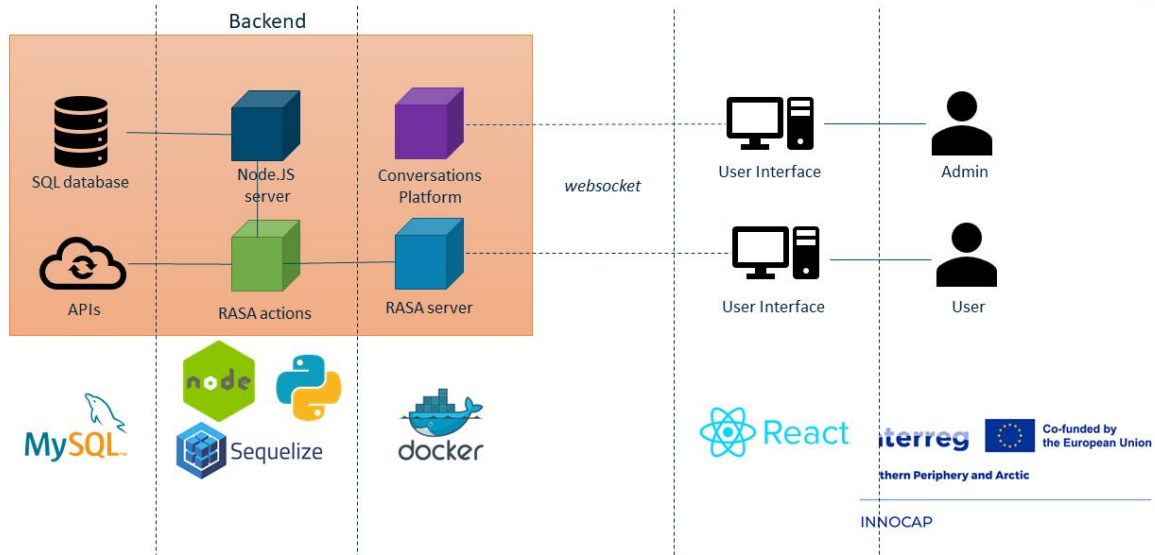
Alternative flow: the user is not willing to provide its address. The chatbot apologies and says it can not help if address is not provided.

Development Iteration





Chatbot Architecture



Data Integration

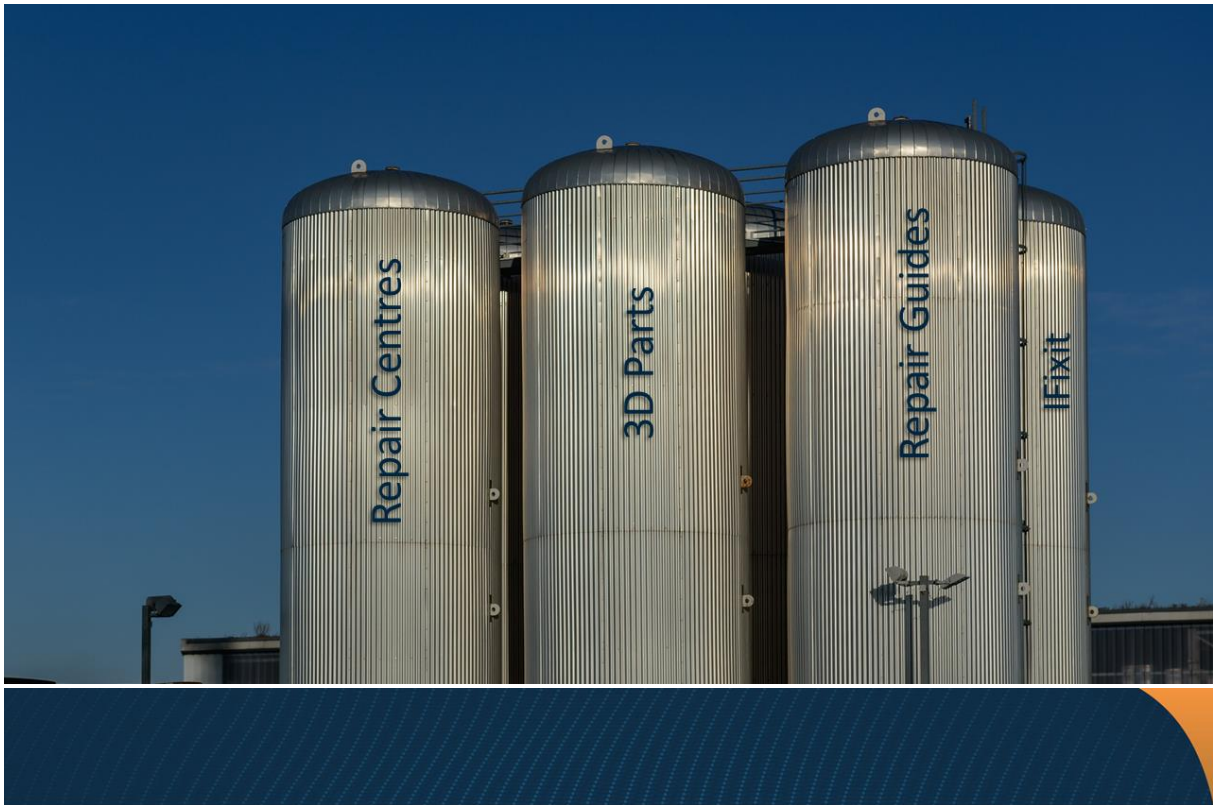
The Open Repair Data Platform case



ORDP

- The project addresses the increasing amount of waste from electrical and electronic equipment and the lack of convenient and accessible repair solutions by scaling up citizen repair initiatives through the use of digital tools

- There are many different 3D parts platforms on the internet;
- 3D platforms hold information about 3D models, but they usually cannot link those models to repair guides from other data sources;
- In the same way, they cannot link different product parts to specific locations where they can be fixed, or where repair support is available;
- There is not a unified data space that integrates different information sources and provides reliable statistics;
- Users end up searching on many different platforms, which is a time consuming task;
- Valuable repair data is not even available nor accessible to the public.



Data is stored in the so called Data Silos, related information systems that are unable to operate together. The information is not adequately shared and remains sequestered within each system.

https://en.wikipedia.org/wiki/Information_silo



Challenges



- Not all the data available follows a standard;
- Data lives in different places and governed by different organizations;
- Data is presented and shared in different formats.



Standardizing Data

Speaking the same language



Open Repair Data Standard (ORDS)

Promoted by the Open Repair Alliance

- Harmonise the data collection efforts;
- Promote it as a standard available to other community repair networks;
- Use the collected data to produce insights;
- Ensure that data is structured, comparable, open, accurate and timely.

<https://standard.openrepair.org/>

Data Interoperability: ADMS

- Data Catalog Vocabulary (DCAT) is an RDF vocabulary designed to facilitate interoperability between data catalogues published on the Web.
- Its usage to describe datasets in catalogues enhances data discoverability and metadata exchange between systems.
- Asset Description Metadata Schema (ADMS) is a profile of DCAT used to describe assets in the context of eGovernment system development.
- Users searching for Assets can have different expectations than someone looking for datasets. Assets are different to datasets since they are expected to be something users can open and read using software tools, in contrast to datasets that need to be processed

<https://www.w3.org/TR/vocab-adms/>



Data Integration Pipeline

What is ETL?

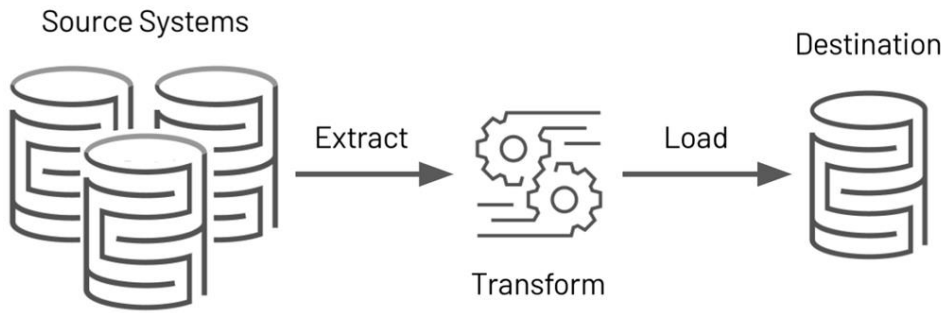
ETL stands for extract, transform, and load. Is the process data engineers use to extract data from different sources, transform the data into a usable and trusted resource, and load that data into the systems end-users can access and use downstream to solve business problems.

- **extracting** raw data from different source
- standardizing it through various **transformations**
- **loading** it into a centralized database



What is ETL?

ETL Process



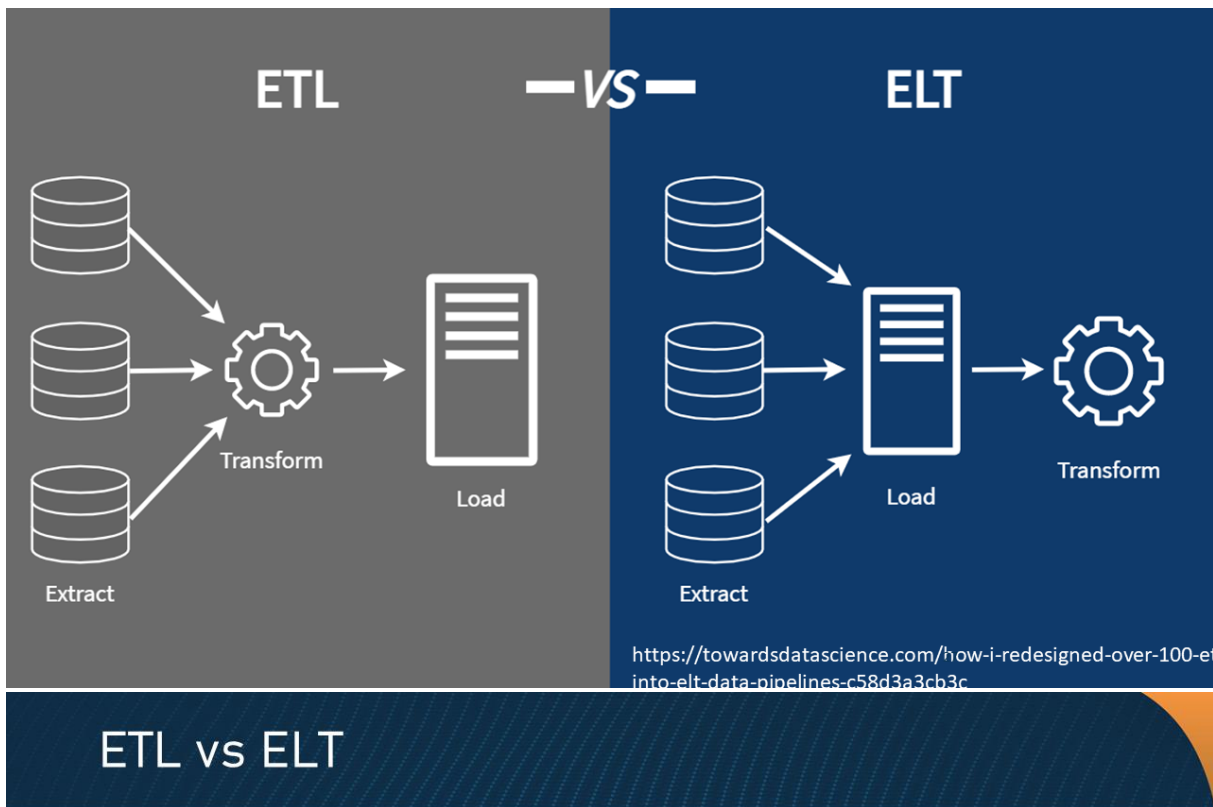
<https://databricks.com/>

by an Union

INNOCAP



... and what is ELT?



ETL vs ELT

- ELT stands for **Extract, Load, Transform**, which is a distinct process from ETL which stands for **Extract, Transform, Load**
- The first step of each method is the same: extracting the raw source data from its original environment
- ELT mean that the data is loaded directly into the destination data warehouse or data lake, where it is transformed before being exported
- The ETL process requires the transformation of data to happen “on the fly”.



Benefits of ELT over ETL

- Repeatabile : Transformations apply the business logic on the data, and we want this process to be repeatable, flexible, and iterative.
- Few errors: when data is persisted before being transformed, transformation bugs can be fixed without data loss or the need for duplicate queries.
- Faster: ETL transforms data on a separate processing server, while ELT transforms data within the data warehouse itself, making it faster.



Meltano

An open-source framework for next-generation data pipelines

Meltano was founded inside GitLab in 2018 as an open-source tool built for GitLab's data and analytics team, who wanted an end-to-end data platform built around open-source components and DevOps principles



Meltano

An open-source ELT platform powered by:

- Singer’s existing library of over 250 community-maintained data extractors and loaders
- dbt’s transformation protocols
- Airflow’s workflow orchestration framework

Meltano

MySQL










CSV



Singer Taps

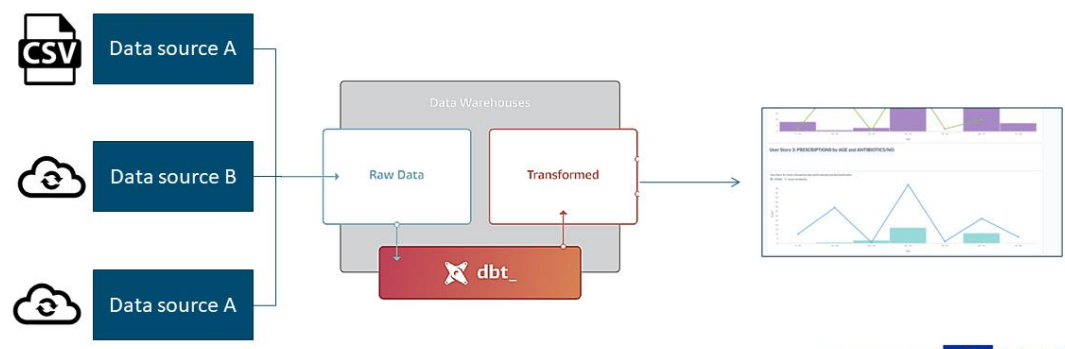



Singer Targets

-  PostgreSQL
-  Google BigQuery
-  Google Sheets
-   Co-funded by the European Union
-  data.world

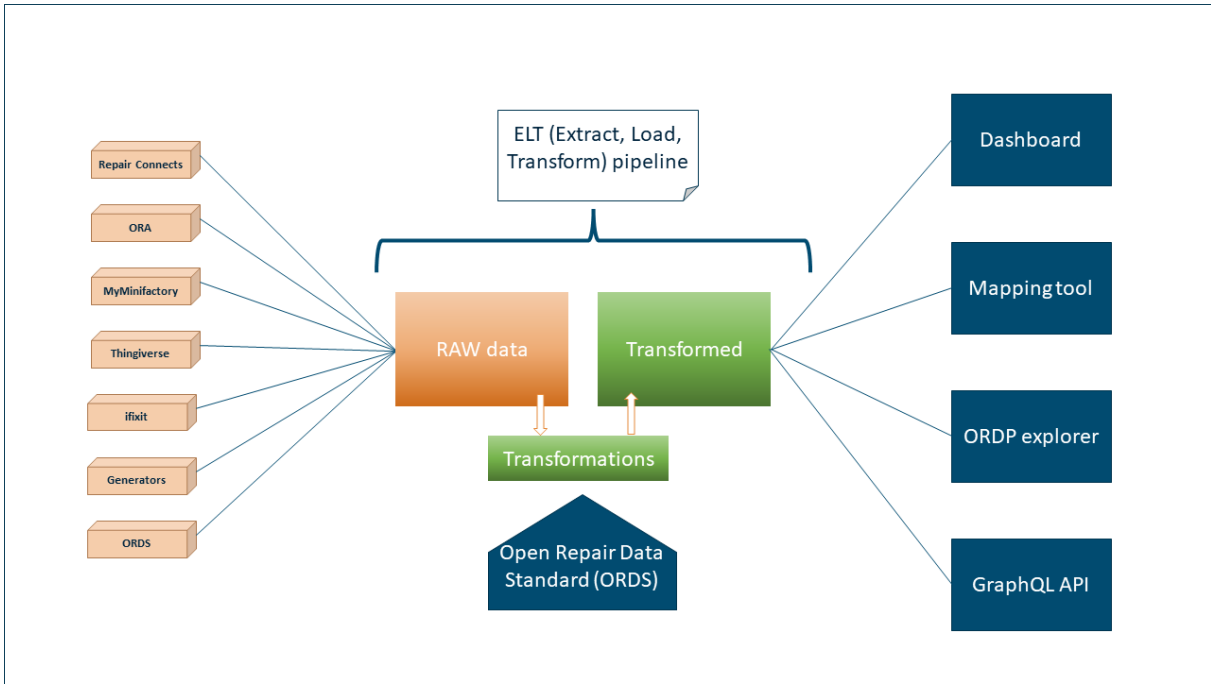


Meltano for ORDP



Some Data Transformations

- Format date fields
- Rename fields
- Join operations: repair barriers names, repair status
- Unification of different data sources
- Data classification based on language



Dashboard

Mappingtool

Find interesting repair locations in your region.

Search by: Type Category Location

Active Filters: Professional Repairer Repair Café Urban Repair Centre FabLab Spare parts shop Repair for second hand sale

ORDP explorer

ORDP EXPLORER

washing machine

Title	Publisher	Issued	Action
Wheel axle for Electrolux dish washing machine	MyMinifactory	2018-12-03T19:10:45-00:00	VISIT
Washing Machine on Wheels!	MyMinifactory	2018-11-07T16:42:12-00:00	VISIT
Mini washing machine	Thingiverse	2018-11-04T14:43:10-00:00	VISIT
Mini washing machine	Thingiverse	2017-08-13T21:15:08-00:00	VISIT
Old House Washing Machine	Thingiverse	2019-01-12T19:58:55-00:00	VISIT

GraphQL API

```

1 query ORDPrepairs($page: Int, $perPage: Int, $locale: ...
2 AvailableLocale!) {
3   repairs(locale: $locale) {
4     ORDPrepairs(page: $page, perPage: $perPage) {
5       brand
6       ordsProductCategory
7       ordsRepairBarrier{EndOfLife
8       ordsRepairStatusLabel
9       organizationName
10      organizationType
11      problem
12      productCategory
13      productCategoryId
14      recordDate
15      source
16      yearOfManufacture
17    }
18  }
  
```



GIS and AI

Towards a Virtual Atlas of Bee-friendly Agriculture

- **79%** of the world's food supply is dependent on honeybees (EU resolution T6-0579/2008)
- **87.5%** of the flowering plants are pollinated by animals (Ollerton et al., 2011)
- Economic value of pollination worldwide is **€ 153 billion** (Gallai et al., 2009)

J. Ollerton, R. Winfree, and S. Tarrant, "How many flowering plants are pollinated by animals?," *Oikos*, vol. 120, no. 3, pp. 321–326, 2011.
N. Gallai, J. M. Salles, J. Settele, and B. E. Vaissière, "Economic valuation of the vulnerability of world agriculture with pollinator decline," *Ecol. Econ.*, vol. 68, no. 3, pp. 810–821, 2009.
Nieto et al., European Red List of Bees. 2014. confronted
T. D. Breeze et al., "Agricultural policies exacerbate honeybee pollination service supply-demand mismatches across Europe," *PLoS One*, vol. 9, no. 1, 2014.
Ú. Fitzpatrick, T. E. Murray, A. Byrne, R. J. Paxton, and M. J. F. Brown, "The Conservation of Bees in Ireland," p. 38, 2006.



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 Ú. Fitzpatrick, T. E. Murray, A. Byrne, R. J. Paxton, and M. J. F. Brown, "The Conservation of Bees in Ireland," p. 38, 2006.

- **9.2%** of bees species are considered threatened with extinction in all of Europe (Nieto et al., 2014)
- Between 2005 and 2010, **22** European countries couldn't reach the demands of pollination (Breeze et al., 2014)
- In **Ireland**, **30%** of **bumblebee** species are current under **threat of extinction** with a further **15%** of 'near threatened' status.

J. Ollerton, R. Winfree, and S. Tarrant, "How many flowering plants are pollinated by animals?," *Oikos*, vol. 120, no. 3, pp. 321–326, 2011.
 N. Gallai, J. M. Salles, J. Settele, and B. E. Vaissière, "Economic valuation of the vulnerability of world agriculture with pollinator decline," *Ecol. Econ.*, vol. 68, no. 3, pp. 810–821, 2009.
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 Ú. Fitzpatrick, T. E. Murray, A. Byrne, R. J. Paxton, and M. J. F. Brown, "The Conservation of Bees in Ireland," p. 38, 2006.



- In Argentina, beekeeper’s records suggest a 30% colonies loss in the last years (Maggi, M. et al. 2016)
- 88% of 50 hives’ honey samples from Santa Fe, Córdoba, La Rioja, Formosa, Entre Ríos, Corrientes, Buenos Aires, Neuquén and Río Negro exhibited rests of pesticides.

Maggi, M., Ruffinengo, S., Negri, P., Brasco, C., Medici, S., Quintana, S., and Eguaras, M. (2016). The status of bee health and colony losses in argentina. *Biology and Ecology of Bee Parasites Honeybees: Foraging Behavior, Reproductive Biology and Diseases*. Ed. Cameron Molley. Nova Publishing Group. ISBN. September. 978–1. (Reynaldi, FJ & Guardia López, AR (2011). Programa de zonificación y promoción del sector apícola en la Provincia de Buenos Aires. Consejo Federal de Inversiones (CFI). Exp nº 11371.)
Medici, S. K., Blando, M., Sarlo, E., Maggi, M., Espinosa, J. P., Ruffinengo, S., Bianchi, B., Eguaras, M., & Recavarren, M. (2020). Pesticide residues used for pest control in honeybee colonies located in agroindustrial areas of Argentina. *International Journal of Pest Management*, 66(2), 163–172. <https://doi.org/10.1080/09670874.2019.1597996>

Factors affecting pollinators include:

- **monoculture cropping practices**
- **natural pollinator habitat decline and fragmentation**
- **pesticides treatments**
- **increased herbicide use**
- **diseases and pests**
- **migratory beekeeping**

M. Ehmke, C. Jones-Ritten, J. Shogren, and T. Panchalingam, "Integrating Ecological and Economic Considerations for Pollinator Habitat Policy," *CHOICES 2nd Quart.*, vol. 30, no. 2, 2015.
L. A. Garibaldi *et al.*, "Safeguarding pollinators and their values to human well-being," *Nature*, vol. 540, no. 7632, pp. 220–229, 2016.
S. G. Potts, J. C. Blesmeijer, C. Kremen, P. Neumann, D. Schweiger, and W. E. Kunin, "Global pollinator declines: Trends, impacts and drivers," *Trends Ecol. Evol.*, vol. 25, no. 6, pp. 345–353, 2010.
M. D. A. Rounsevell, J. E. Annetts, E. Audsley, T. Mayr, and I. Reginger, "Modelling the spatial distribution of agricultural land use at the regional scale," *Agric. Ecosyst. Environ.*, vol. 100, pp. 465–479, 2003.
G. F. L. "Striking a new balance between agricultural production and biodiversity," *Ann. Appl. Biol.*, vol. 146, no. 2, pp. 163–175, 2005.



During 2016, 54.34% of Argentina’s surface was used for agriculture;
The use of agrochemicals in Argentina has increased 1000% in the last 20 years, and glyphosate represents 75% of the agrochemicals used in 2006 compared to 50,1% in 1991. (Baumgartner & Cherlet, 2015).

Huais, P. Y., Grilli, G., Amarilla, L. D., Torres, C., Fernández, L., & Galetto, L. (2020). Forest fragments influence pollination and yield of soybean crops in Chaco landscapes. *Basic and Applied Ecology*, 48, 61–72.
Cavigliasso, P., Phifer, C. C., Adams, E. M., Flaspohler, D., Gennari, G. P., Licata, J. A., & Chacof, N. P. (2020). Spatio-temporal dynamics of landscape structure and stingless bees pauloensis (Hymenoptera: Apidae) and its relationship with pollen provisioning. *PLoS ONE*, 15(7 July 2020), 1–18.
Vossler, F. G. (2019). Pollen diet assessment and flower association in *Melipona orbignyi* and recommendations on management and conservation of stingless bees in the Chaco dry forest of South America. *Apidologie*, 50(4), 391–413. <https://doi.org/10.1007/s13592-019-00653-4>





Supporting Bee-Friendly Agriculture in Argentina

- Continuation of Research Master thesis “GeoAI Models for Land Use Classification: Exploiting the Temporal Dimension of Remotely Sensed Imagery”;
- Part of the Microsoft AI for Earth community;
- Awarded a National Geographic Explorers grant.



Goals of the project

01 COLLECT

Geolocated data on agricultural practices and land use. As well as on the distribution and abundance of different varieties of native bees and honeybees.

02 DEVELOP

Artificial intelligence algorithms that help to improve the automatic classification of agricultural practices and land use through satellite images.

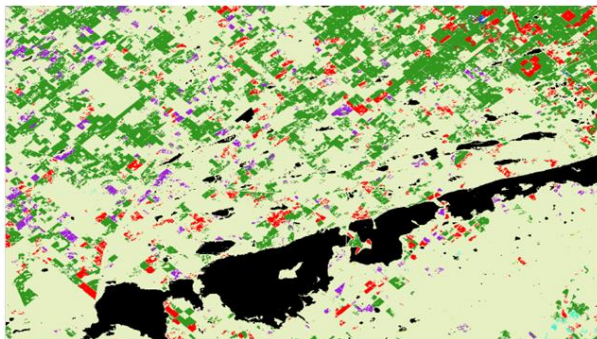
03 EXPLORE

The relationships between land use and the welfare of bees.

04 PROMOTE

More sustainable agricultural and land management practices that benefit bees. Interest in the conservation of biodiversity.

Are there geolocated datasets available?



- Available for periods 2018-2019, 2019-2020, 2020-2021;
- 30 metres resolution
- Missing classes of interest
- Salt and pepper effect

<http://www.geointa.inta.gob.ar/2021/09/07/mapa-nacional-de-cultivos-campana-2020-2021/>
<http://www.geointa.inta.gob.ar/2020/10/06/mapa-nacional-de-cultivos-campana-2019-2020/>
<http://www.geointa.inta.gob.ar/2019/09/10/mapa-nacional-de-cultivos-campana-20182019/>



Geospatial Data Collection Tools

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++++++

“Without data, you are just another person with an opinion” - W. Edwards Deming

++++++
++++++

Desktop Mapping

An abstract background with various colors including purple, pink, blue, and red. It features several patterns: wavy lines, a grid of dots, and irregular shapes. The text is overlaid on this background.

AGROHISTORIAS

<http://agrohistorias.org/>



interreg  Co-funded by the European Union
Northern Periphery and Arctic



The screenshot shows the 'MAPA' view of the AgriHISTORIAS application. A satellite map displays a yellow polygon over a field. A table on the right lists the polygons:

Polygon ID	Area (hectareas)	Acción
0	21.50	[Icon]
1	25.26	[Icon]

Below the table, it indicates 'Rows per page: 5' and '1-2 of 2'.

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The screenshot shows the 'DESCRIPCIÓN' view of the AgriHISTORIAS application. It features a text editor with the following content:

Crea una historia
 Puedes contar con palabras tu historia en esta sección y ayudarnos a recolectar datos de la misma en la sección "Mapa" de la derecha.

Title: test

Un modelo sin agrotóxicos
 La chacra La Aurora, de 650 hectáreas, fue premiada por la FAO como una de las 52 experiencias mundiales de explotación con agroecología. No utilizan agrotóxicos y su rendimiento económico es muy superior al de los campos transgénicos.

En una región dominada por transgénicos y agroquímicos sobresalen 650 hectáreas rebeldes, donde producen (sin venenos) trigo, ganadería y pasturas desde hace veinte años. Priorizan la producción, pero también el cuidado del ambiente y los alimentos sanos. A contramano del agrogeneo, la chacra (llamada La Aurora) está ubicada en el sur bonaerense y fue seleccionada por la FAO (organismo de Naciones Unidas) como una de las mejores experiencias mundiales de agroecología. Mantiene buenos niveles de producción, tiene menores costos que los campos transgénicos y cuenta con buenos márgenes de rentabilidad. Juan Kiehr, al frente de la chacra, resume su filosofía: "Quiero dejarle a mis nietos un campo mejor del que heredé". Benito Juárez está ubicada en el sur bonaerense, a 400 kilómetros de la ciudad de Buenos Aires. A fines de la década del 90, cuando comenzaba a desplegarse el modelo transgénico, la campaña publicitaria y las instituciones del Estado llamaban a apostar por ese modelo. Juan Kiehr y su pareja, Ema Blot, no aceptaron. Ya usaban algo de agroquímicos para los cultivos, pero querían dejar de utilizarlos y percibieron que el modelo transgénico era todo lo contrario. Cruzaron en esa búsqueda a Eduardo Cerdi, ingeniero agrónomo que ya trabajaba en campos en transición hacia otro modelo, sin agrotóxicos. Y decidieron que La Aurora, 650 hectáreas, iniciara ese camino con trigo, pasturas y vacunos. Tuvieron la precaución de tomar nota de todo. Qué cultivaban en cada cuadro, cuánto cosechaban, qué cantidad de vacunos tenían, cuántos terneros cada año, los gastos, los ingresos, todo. Pronto confirmaron que podían vivir sin transgénicos ni agroquímicos. "Nunca osamos necesidad, no nos endeudamos, no nos faltó nada", suele repetir Kiehr.

INNOCAP



Agregá datos al polígono seleccionado

Utilice las siguientes opciones para describir el historial de su parcela. Puede comenzar seleccionando una o varias clases (en el caso de cultivos asociados) en el primer paso y seleccionando un período de tiempo en el segundo paso. Puede agregar más datos para un período de tiempo diferente después del paso 2. Siempre puede ver los datos que está almacenando en la tabla a su derecha.

1 Seleccione el uso del suelo

Agricultura

Alfalfa Arveja Avena Cebada Cebadilla

Centeno Centeno Colza Festuca Girasol

Maíz temprano Maíz tardío Maíz Mijo Moha

Pasto llorón Pasto miel Pasto ovillo Soja de 1°

Soja de 2° Sorgo Sorgo forrajero Trigo Triticale

Trébol blanco Trébol rojo Vicia

Otros usos

Uso del suelo	Comienzo	Final	Acciones
Sorgo	06/01/2022 (semana 01)	14/01/2022 (semana 02)	REMOVER
Arveja	05/01/2022 (semana 01)		REMOVER

CERRAR

- The tool allows the mapping of more than 30 land use classes
- It allows the mapping of **crops rotations** (a sequence of crops grown one after each other in a single field), and **crops association** (the growing of two or more crops in the same field at the same time)



AGROHISTORIAS

agrohistorias.org



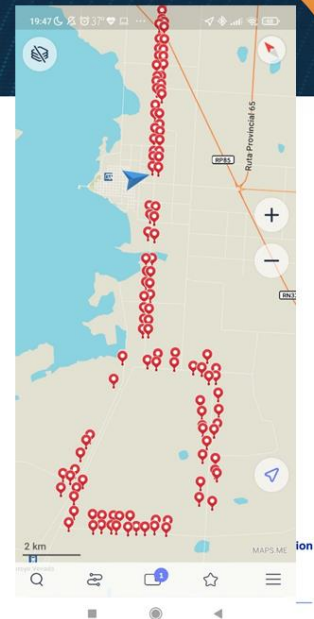


Mapping on the field

Because internet connectivity is limited



More than 300 data points sampled

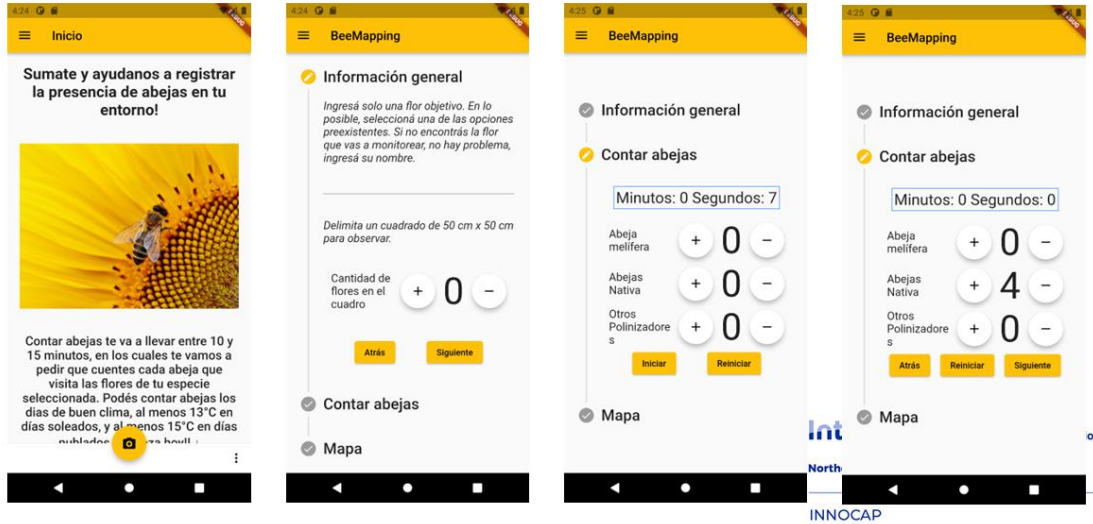




Where are the bees and where (and why) are they thriving?



Data Collection Tools



Development

AI can help automate geospatial data creation

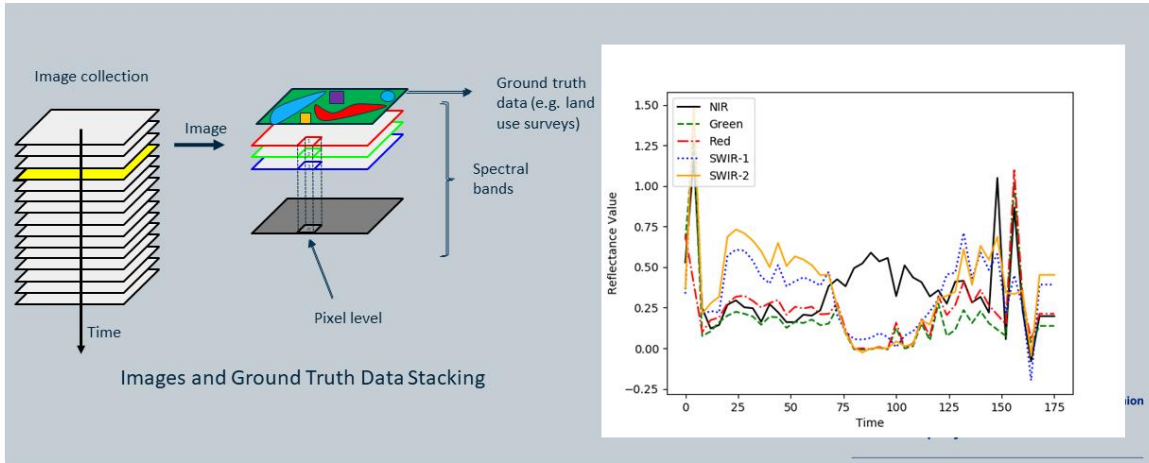


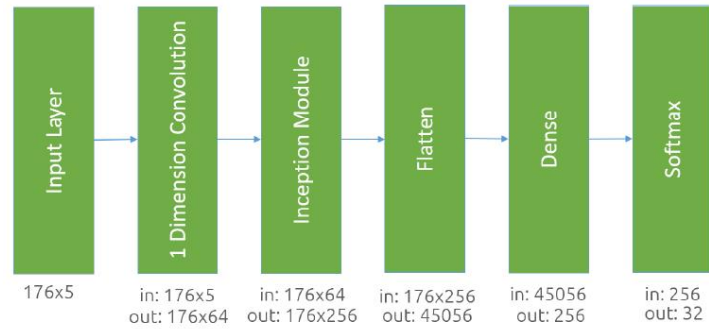
GeoAI Models for Land Use Classification: Exploiting the Temporal Dimension of Remotely Sensed Imagery

We use Convolutional Neural Networks (CNNs) applied to the temporal and spectral dimension of satellite imagery to classify agricultural land use:

- more than 30 agricultural classes classification with more than 86% accuracy.
- single cropping and double cropping classification with almost 95% accuracy.
- results significantly outperform the state-of-the-art algorithms.

Images and Ground Truth Data Stacking



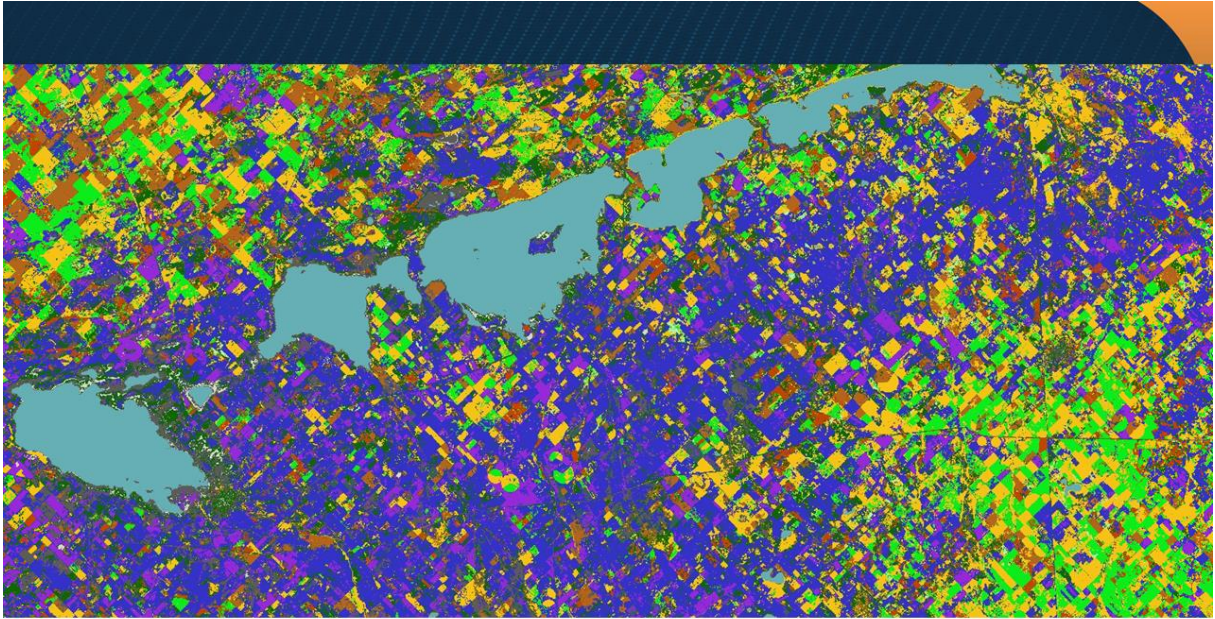


A. G. Pereira, L. Porwol, A. Ojo, and E. Curry, "Exploiting the Temporal Dimension of Remotely Sensed Imagery with Deep Learning Models," 54th Hawaii Int. Conf. Syst. Sci., pp. 5317–5326, 2021, [Online].
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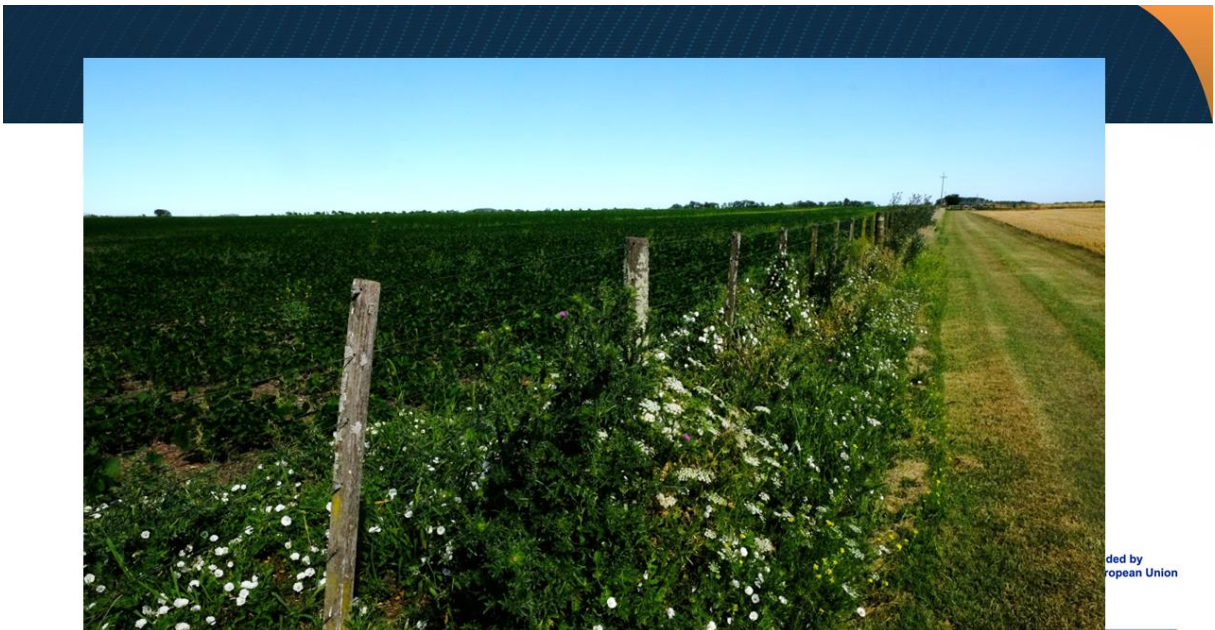
Sentinel-2 Imagery

- Multi-spectral data with 13 bands;
- Spatial resolution of 10 m, 20 m and 60 m;
- Free and open data policy;
- 5-day global revisit periodicity.





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- The foraging area around a beehive extends for ~ two miles (3.2 km)
- Having high resolution maps can help us identify beneficial locations for bees where they can avail of food (pollen and nectar)
- Yearly land use high resolution maps can help us identify beneficial practices such as crop rotations (reduce the need for pesticides and herbicides and increases the availability of flowering plants);



INNOCAP

Building public sector innovation capacity towards digital-driven NPA communities

INNOCAP Workshop 3: IoT and Blockchain
Online - 19.05.2023

Interreg  Co-funded by the European Union

Northern Periphery and Arctic

INNOCAP

IoT



What is IoT and why you should consider it?



IoT

The **Internet of things (IoT)** describes physical objects (or groups of such objects) with sensors, processing ability, software and other technologies that connect and exchange data with other devices and systems over the Internet or other communications networks. Internet of things has been considered a misnomer because devices do not need to be connected to the public internet, they only need to be connected to a network, and be individually addressable.

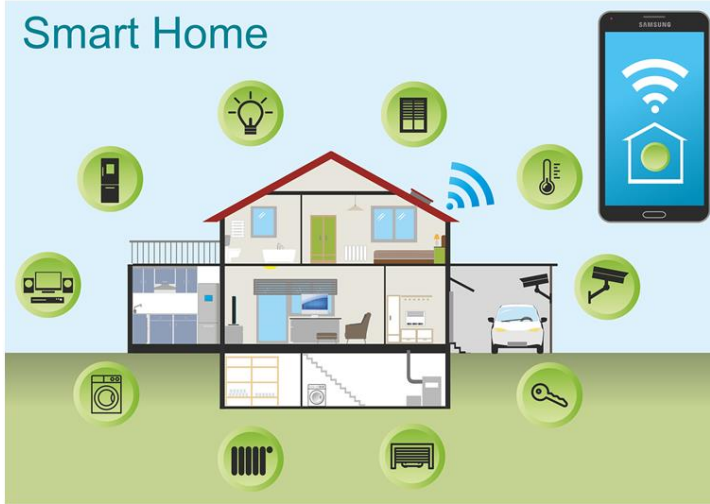
Wikipedia

IoT – Over The Internet

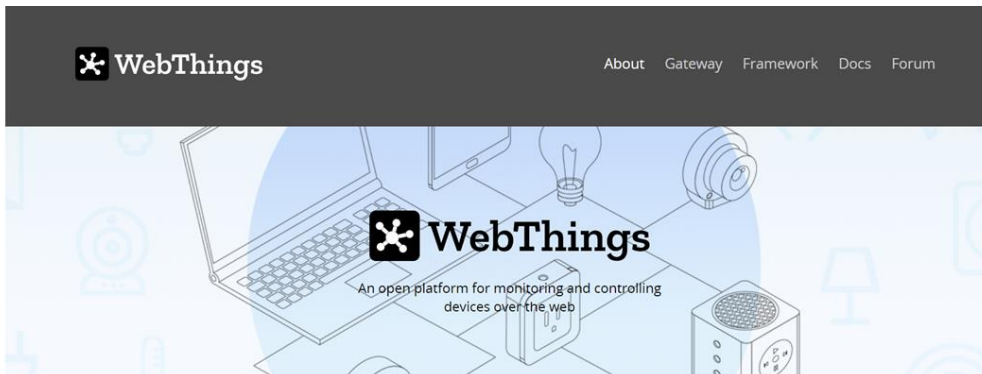




IoT

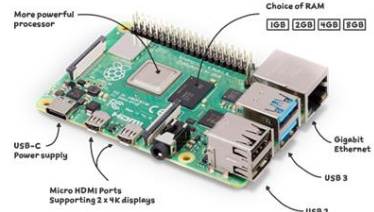
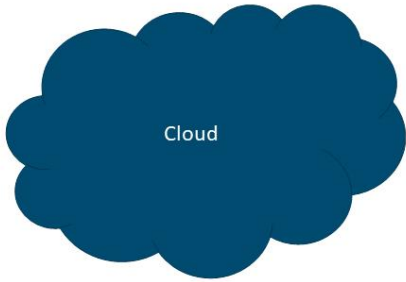


IoT - WebThings





IoT



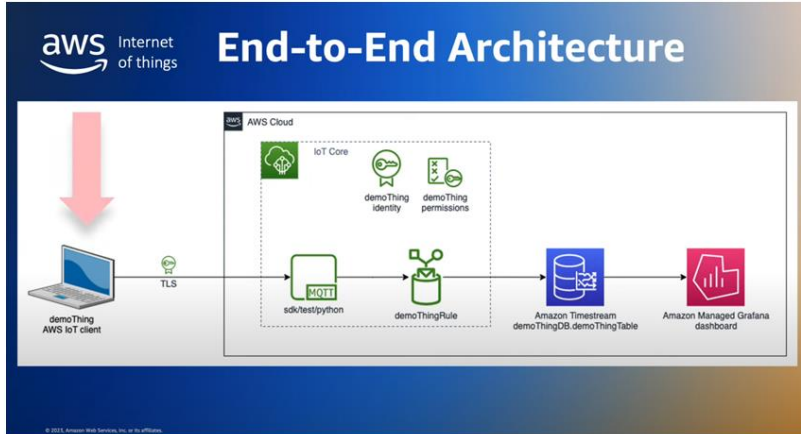
<https://www.raspberrypi.com/>

IoT





IoT



<https://www.youtube.com/watch?v=z8T4hAERuOg/>

IoT AirTag

Your AirTag sends out a secure Bluetooth signal that can be detected by nearby devices in the Find My network. These devices send the location of your AirTag to iCloud — then you can go to the Find My app and see it on a map. The whole process is anonymous and encrypted to protect your privacy.



Apple

Each Apple ID can be associated with up to 16 AirTags



Blockchain



A blockchain is a **distributed ledger** with growing lists of records (blocks) that are securely linked together via cryptographic hashes

Crypto Wallet



A cryptocurrency wallet is a device, physical medium, program or a service which stores the public and/or private keys for cryptocurrency transactions. In addition to this basic function of storing the keys, a cryptocurrency wallet more often offers the functionality of encrypting and/or signing information.

Wikipedia



Crypto Wallet



MetaMask is the leading self-custodial wallet. The safe and simple way to access blockchain applications and web3.

The crypto wallet for Defi, Web3 Dapps and NFTs

Cryptocurrency - Bitcoin




Bitcoin is a decentralized digital currency that operates without the need of financial system or government authorities. It utilizes peer-to-peer transfers on a digital network that records all cryptocurrency transactions

Investopedia




Smart Contracts



Smart contracts are code written into a blockchain that executes the terms of an agreement or contract from outside the chain. It automates the actions that would otherwise be completed by the parties in the agreement, which removes the need for both parties to trust each other

Investopedia

dApps and DaOs



Decentralized applications—also known as "dApps" or "dapps"—are digital applications that run on a blockchain network of computers instead of relying on a single computer. dApps are free from the control and interference of a single authority

Investopedia



dApps and DaOs



A decentralized autonomous organization, sometimes called a decentralized autonomous corporation, is an organization managed in whole or in part by decentralized computer program, with voting and finances handled through a blockchain. In general terms, DAOs are member-owned communities without centralized leadership

dApps and DaOs

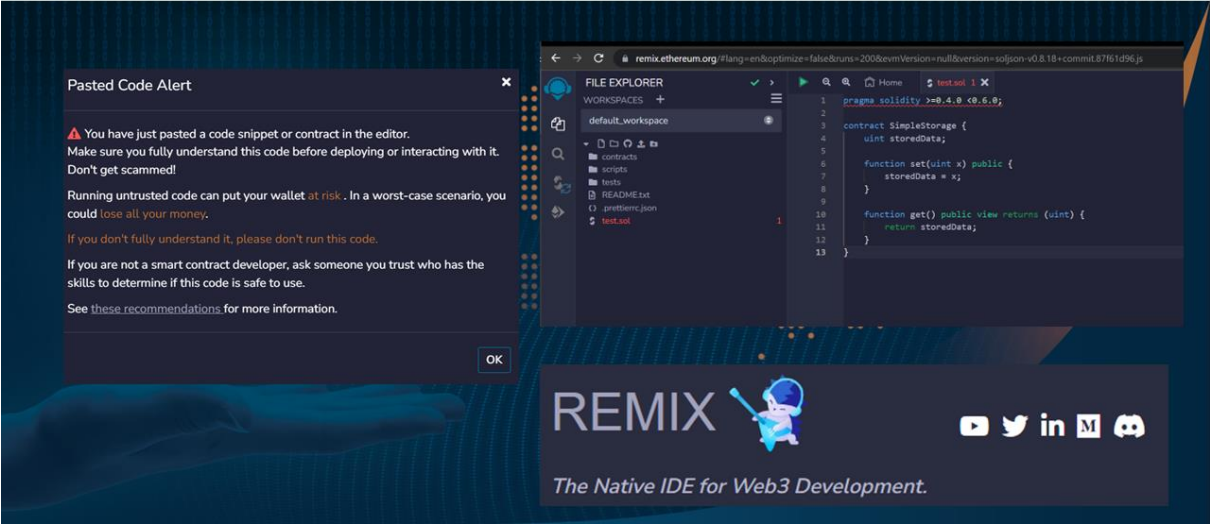


DAOs use smart contracts to work in a blockchain. These smart contracts are made of chunks of code that help execute operations automatically when a set of criteria are met. While Ethereum was the first blockchain to use smart contracts, it is deployed on various other blockchains these days

Simplilearn



Creating Smart Contracts



Pasted Code Alert

⚠ You have just pasted a code snippet or contract in the editor. Make sure you fully understand this code before deploying or interacting with it. Don't get scammed!

Running untrusted code can put your wallet at risk. In a worst-case scenario, you could lose all your money.

If you don't fully understand it, please don't run this code.



If you are not a smart contract developer, ask someone you trust who has the skills to determine if this code is safe to use.

See [these recommendations](#) for more information.

OK

```

1  pragma solidity >=0.4.0 <0.6.0;
2
3  contract SimpleStorage {
4      uint storedData;
5
6      function set(uint x) public {
7          storedData = x;
8      }
9
10     function get() public view returns (uint) {
11         return storedData;
12     }
13 }
    
```

REMIX  

The Native IDE for Web3 Development.