



INNOCAP – Disruptive innovation Knowledge Map

D1.2.1



Document history

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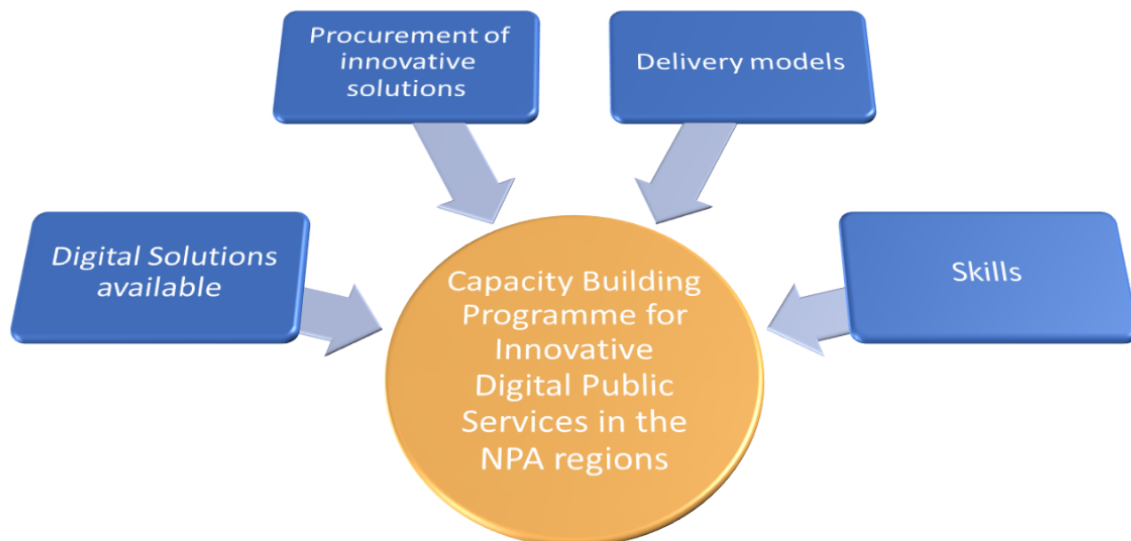
1 Introduction

The purpose of this document is to gather and share experiences coming from the different partners and other organisations in the participating regions. This will be an important asset to be used when defining and implementing the capacity-building programme intended to enable public sector organisations to introduce disruptive innovations in their task of providing quality and sustainable public services.

The set of tools, methods and skills presented in this document is not exhaustive and INNOCAP consortium will work actively to choose the most suitable and up-to-date solutions at any stage of the project. That is particularly important considering the fast-changing pace of the emerging technologies included in the capacity-building programme. In particular AI and AR/VR technologies experience growth at unprecedented rates, and we expect significant evolution of the solutions in the duration of this project. As we progress with the delivery of the capacity-building programme we will monitor the technological changes. We will work in an agile loop with project partners and a broad set of stakeholders to ensure the most suitable approach.

2 INNOCAP framework

The experiences identified are grouped under the 4 dimensions tackled by INNOCAP:

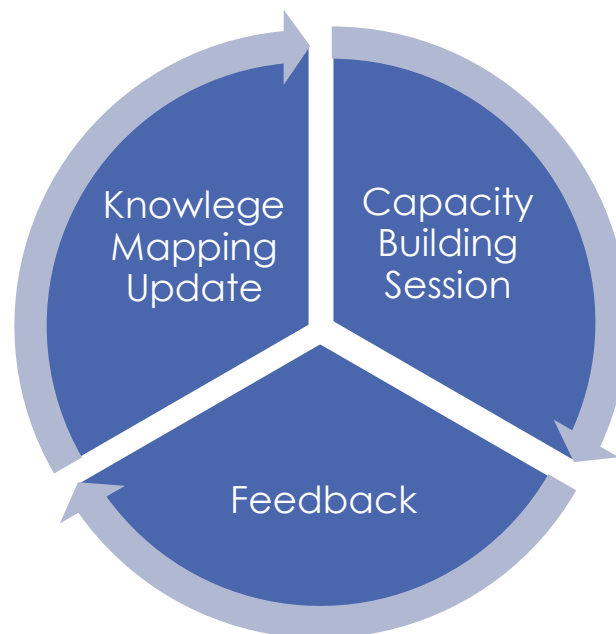




3 INNOCAP knowledge mapping validation and update

It is our intention to use the upcoming consortium meeting in Iceland in September to validate the knowledge mapping to date and provide relevant updates to our capacity building plan. In particular, we will use that meeting to deliver the first capacity building session and collect feedback from partners live and in the form of questionnaire immediately after the meeting. This will allow for agile adjustment of delivery and effective tracking of organisational change (including technology acceptance) and evolving views and perspectives on emerging technologies introduced to the partners.

Therefore, we consider knowledge mapping as a continuous process that will evolve as we deliver the capacity building programme. We visualize that process below:



We need to ensure that our delivery is flexible to accommodate both technological changes due to fast changing landscape of tools as well as the evolution of partners' organizational priorities and consequent pilot changes. With every session we shall collect feedback that will inform us about the next cycle of capacity building. Relevant updates to this document that will also involve partners' experience with the technologies will be included in annexes of future deliverables.



4 List of experiences

In this section short descriptions of the experiences gathered are provided. They are grouped under the 4 main INNOCAP dimensions.

Detailed descriptions can be found in Annex 1.

4.1 Digital solutions

Experience name	Origin	Short description
Artificial Intelligence chatbots	Derry and Strabane (Northern Ireland) / Västernorrland (Sweden) – EMERGREEN project	<p>A chatbot is a computer program or an artificial intelligence which conducts a conversation via auditory or textual methods. Such programs are often designed to convincingly simulate how a human would behave as a conversational partner.</p> <p>Artificial intelligence powered chatbots use Natural Language Processing (NLP) and Machine Learning (ML) to better understand human needs and provide a more natural, near-human level communication.</p>
Omaidea digital participation platform	South Savo (Finland)	<p>Omaidea (www.omaidea.fi, in English “Own idea”) is a digital participation platform to support citizen engagement with different digital participation tools (surveys, idea collection and supporting, discussion forum etc.) on versatile topics. The University of Helsinki, Ruralia Institute, developed the digital participation service to address the overall aim of the EMERGREEN project to promote greener communities in remote areas. The platform was developed in partnership with the local stakeholders such as the associate partner, the City of Mikkeli.</p> <p>The platform addresses several interrelated objectives:</p> <ul style="list-style-type: none"> • To promote innovative and versatile citizen participation in the City of Mikkeli and the region of South Savo, especially in remote and sparsely populated areas. • To raise awareness on sustainability issues, circular economy and climate change, • To engage citizens to actively contribute to and promote everyday sustainability solutions and green lifestyles.
Digitization Guide	Västernorrland (Sweden)	A platform for collaboration and exchange of experience for those who work with digitizing welfare. Here you can



Experience name	Origin	Short description
		<p>get tips on concrete methods and tools to use and be inspired by other people's solutions to the same problems that your organization is currently facing. You can choose challenges within your business area, see solutions and contribute with your own examples. The digitization guide makes your digitization journey easier! Based on the municipalities' area of activity, there are various challenges where you as an entrepreneur can also contribute with solution proposals.</p> <p>In the initial phase, the Digitization Guide has concentrated on disseminating knowledge and experiences around the following eight currently very current challenges in the guide.</p> <ol style="list-style-type: none"> 1) Prerequisites for automations 2) Secure digital communication (SDK) 3) API strategy (system integration) 4) Cohesive digital service within the school (school portal) 5) Digital competence phase 1 6) Case management process 7) Digital exclusion 8) Digital signing
Improving Psychological Health & Safety in Health Care Workers through Technology Based Support Project	Newfoundland and Labrador (Canada)	<p>This initiative undertook a pilot tested approach to improving mental health and safety through technology-based support. Eastern Health, a local regional health authority, is leading the project to determine if technology-based support increases employee knowledge and uptake of psychological support services, in turn improving employee wellness factors and organizational healthy workplace indicators.</p> <p>Eastern Health is the largest employer in Newfoundland and Labrador, employing almost 13, 0000 employees, 82% of them are women, about 10% come from rural parts of the eastern region. The organization currently has below average engagement scores and significant rates of sick leave and absenteeism. This project aims to target all employees within the organization.</p> <p>This three-year project involves the development, implementation and evaluation of application-based technology (from personal technology devices) which will incorporate internal and external supports to the organization as well as a built-in peer "chat" function, allowing employees to gain timely and appropriate support and information about what is available for them.</p>
VR-Dialogue	Ireland	VR-Dialogue is an independently-hosted social VR platform allowing for local deployment and advanced data



Experience name	Origin	Short description
		<p>analytics. The platform has been developed as part of the EC-funded Next Generation Internet Explorers program through EU-USA collaboration between the University of Galway and Simmons University, Boston. The tool has been built upon the Mozilla Hubs framework, an Open Source VR platform by Mozilla Foundation. The platform allows for interface-agnostic access to custom-hosted VR venues. In particular, users can join common meetings via web browser on their computer, mobile or tablet, as well as next-gen immersive VR headsets. The tool has been successfully used in the USA as a novel approach to train librarians in managing unexpected scenarios. Moreover, the platform was used to run sociological studies on conscious and unconscious biases in VR interaction themed with Climate change.</p> <p>The platform allows for full, privacy-aware, GDPR-compliant data control and analytics without fear of sharing data with third parties.</p>
ORDP – Open Repair Data Platform	Ireland	<p>Developing the Open Repair Data Platform – ORDP, has been one of the key objectives and tasks in the Sharepair project. The aim was to deliver an integrated data space for repair information collected across Europe.</p> <p>There are many datasets containing relevant and valuable data about repairs. More and more, these datasets are used in campaigns fighting for the Right to Repair, and luckily also in policy making. Aggregated repair data can give very valuable insights. As in any data project, there are big challenges as to:</p> <ul style="list-style-type: none"> • work with a large and representative enough dataset • work with clean data • work with structured data <p>One of the Sharepair objectives was to take that mission of data aggregation even further and scale it up to a less manual exercise. And that resulted in the Open Repair Dataspace Platform. The scaling goals were, among others:</p> <ul style="list-style-type: none"> • to include 'data types' other than registrations of repairs done, like data about 'repair organisations', 'repair manuals' and '3D printing files' • to have a real-time and open dataspace that can be queried by anyone or any tool or website, to retrieve specific data
Saffron Knowledge Extraction	Galway, Ireland	Saffron provides knowledge extraction for English from text using natural language processing. Saffron is a highly configurable open-source framework that is available



Experience name	Origin	Short description
		<p>through command line or Web interface. Saffron applications range from expert finding and community detection to text analytics, enterprise search and recommender systems. See Applications for a more detailed list of possible uses of Saffron and Use Cases for an insight into previous and current Saffron projects.</p> <p>Term Extraction Given a collection of texts written in English, the term extraction phase of Saffron automatically identifies and extracts concepts that are relevant for the domain of the dataset, allowing you to get a quick insight on the content of your dataset.</p> <p>Taxonomy Extraction This component allows to organise together the terms extracted from the dataset by way of taxonomic relations and gives a representation of the domain knowledge.</p> <p>Expert Finding and Community Identification Saffron identifies experts among the authors of documents through automatic analysis of terminology and ranking of authors. In addition, the expert finding stage of Saffron identifies communities of experts by automatic grouping, again based on their use of automatically extracted terminology.</p>
ADR (AI, Data, Robotics) Observatory of standards	Galway, Ireland	An online observatory of standards and standardisation activities, developed with a group of experts in the field.
ADR (AI, Data, Robotics) Cartography	Galway, Ireland	An open repository of major European and national initiatives in the field of AI, Data and Robotics.
ADR (AI, Data, Robotics) Awareness Centre for Education and Outreach	Galway, Ireland	An online repository for useful materials (cartographies, standards, and educational resources).



4.2 Procurement of innovative solutions

Experience name	Origin	Short description
Small Business Innovation Research (SBIR)	Ireland	<p>SBIR is a mechanism which enables public sector to connect with innovative ideas and technology businesses to provide innovative solutions for specific challenges. SBIR's aim is to drive innovation across all sections of the Irish Public Sector via robust engagement with technology rich companies and organisations, through competitive challenges. SBIR itself is underpinned by a sharing of both risks and benefits between Contracting Organisations and Suppliers.</p> <p>SBIR falls under the category of pre-commercial procurement (PCP). PCP as defined by the European Union, involves the purchase of research by a government entity, which is undertaken with the objective of stimulating innovation that the contracting authority or some other party may benefit from at a later stage, when goods or services are not currently available or developed from the outcomes of the research.</p>
KEINO competence Centre	Finland	<p>KEINO, in English "Means" is a networked Competence Centre founded in 2018 to increase sustainable and innovative public procurement. KEINO aims to improve the effectiveness and quality of public procurement and public services.</p> <p>The main objectives are:</p> <ul style="list-style-type: none"> • increasing the number of innovative and sustainable procurements in Finland, • public procurement is recognized and actively used as a management tool and • contracting entities openly disseminate information on their experiences and learn from one another.
ADRA-E	Galway, Ireland	<p>Adra-e supports the AI, Data and Robotics Association and Partnership to create the conditions for a sustainable European Ecosystem. Support the update and implementation of the AI, Data and Robotics Strategic Research, Innovation and Deployment Agenda; Map the AI, Data and Robotics landscape and infrastructures to deliver services and build connections between structured initiatives; Increase innovation capacity and adoption of core AI, Data and Robotics technology with applications; Raise awareness of the Adra association and partnership to citizens, businesses, public administrators, and educators; Support the development of standards and regulations maintaining European technological sovereignty.</p>



<p>AI-on-Demand Platform</p>	<p>Galway, Ireland</p>	<p>The AI-on-Demand Platform (AIoD) is a community-driven channel designed to empower European research and innovation in Artificial Intelligence (AI), while ensuring the European seal of quality, trustworthiness and explainability. AIoD facilitates knowledge sharing, research experimentation and development of state-of-the-art solutions and technologies related with AI and AI-based robotics.</p> <p>AIoD is an open and easily accessible environment for the AI community, including AI researchers from academia and industry, students, SMEs, Tech providers and EU funded projects, Digital Innovation Hubs and other EU bodies, who can use AIoD by:</p> <ul style="list-style-type: none"> • Contributing with AI-related knowledge, assets, services or tools; • Making use of the numerous resources available, including educational courses; • learning about the potential and opportunities of AI applications; • Engage with other peers and experts.
<p>AI Trust Label</p>		<p>Tool to support organizations in understanding of the potentialities, quality, performance and trustworthiness of AI technologies and applications.</p>



4.3 Delivery models

Experience name	Origin	Short description
Co-production technology (IMPROVE)	Ireland	<p>Methodology developed within the IMPROVE project to guide regions in the process of co-producing new services with their communities in a living lab environment helping them to:</p> <ul style="list-style-type: none"> • Establish the innovative living lab ecosystem formed by all the relevant stakeholders • Effectively carry out the needed adaptation and organizational change in each stakeholder • Provide the public services providers (civil servants, community managers, volunteers, social enterprises, etc) with the necessary tools and skills to act as local champions leading the process of co-producing the new services • Engage and involve the community • Co-produce user-centred, inclusive, responsive and transparent services <p>The methodology includes a transnational dimension and also provides guidance for the establishment of the IMPROVE transboundary living lab and how the participating regions can have access to other centres of knowledge.</p>
Innovation as a Service (IaaS)	Ireland	<p>The Innovation as a Service (IaaS) action is aimed to increase the uptake of disruptive technology solutions by SMEs in the Irish Border region to accelerate their competitiveness and innovation levels. This is key to enabling SMEs to address the twin threats of Brexit and Covid-19. The unique approach of the project is to use sophisticated digital collaboration services to better network and connect the Border region's growing network of innovation hubs to technology providers (universities and institutes of technology) across the Border and West regions in Ireland.</p>
Regional Analytics Laboratory (RAnLab)	Newfoundland and Labrador (Canada)	<p>The Harris Centre Regional Analytics Laboratory (RAnLab) focuses on the use of regional economic and spatial analytics to quantitatively assess the capacity and sustainability of industries, labour markets and the population of places for the purpose of informing evidence-based policies for regional development.</p>
Bounce Health Innovation (BHI)	Newfoundland and Labrador (Canada)	<p>BHI's mission is to accelerate the growth of the health innovation sector in Newfoundland and Labrador (NL) with a vision to help the province become the testbed for medical technology innovation in North America. BHI engages with and supports medical innovators and</p>



Experience name	Origin	Short description
		<p>entrepreneurs by leveraging resources within a unique health innovation ecosystem.</p> <p>The BHI BOUNCE Lab is located in Memorial University's Faculty of Medicine and is a showcase open-concept co-working space used by the Bounce team, founder-clients and entrepreneurial students. The lab's location strategically positions it at the intersection of academia (Memorial University via MCE and the Faculty of Medicine), the health system (Eastern Health & NLCHI), industry (NATI and Genesis) and the Province of NL (Departments of Health and Community Services and Industry, Energy and Technology). The Bounce Lab is easily accessible during business hours on a drop-in or appointment basis. Hot-desking and private meeting rooms are readily available.</p> <p>Additionally, Eastern Health's Living Lab and NLCHI's DataLab provide the ideal clinical testing environment for early-stage technologies designed for the health sector.</p>
VR-Lab	Galway, Ireland	<p>The Virtual Reality Lab - VR-Lab is hosted at Insight Centre for Data Analytics, University of Galway. The Lab offers access to different Virtual Reality and Augmented Reality technologies. Researchers and visitors can explore different XR (VR/AR) experiences and learn about cutting-edge technologies through demos, virtual tours and showcases. The hardware inventory of solutions includes an array of 3-degree and 6-degree freedom VR headsets, AR headsets, as well as 360-degree cameras, and multimedia equipment. The lab can host groups in interactive VR experiences for training and educational purposes. Insight Centre hosts workshops for EU projects as well as hosts tours and events for businesses and the public.</p>
Data-driven business model for public organizations - Workshop	Galway, Ireland	<p>Workshop on the use of data-driven business model for public organizations using data as the main organizational resources to deliver public service in a more cost effective and benefit-generative way. Workshop brought together several European stakeholders to use and evaluate the model.</p>
Open Data Cafe	Galway, Ireland	<p>A series of events focusing on open data's contribution to open scholarship</p>
Security Implications of ChatGPT	Galway, Ireland	<p>This is a white paper that provides guidance across four dimensions of concern around this extremely popular Large Language Model. The paper aims to provide a high-level overview of the implications of ChatGPT in</p>



Experience name	Origin	Short description
		<p>the cybersecurity industry and it explores the key concepts and domains that are crucial for understanding ChatGPT's capabilities, as well as the potential impact on businesses in the coming years. What is particularly interesting about this paper is that it also provides a useful brief history of this relatively recent (if explosive) development. Additionally, the paper provides some clarity and suggestions about managing the risks in leveraging ChatGPT. See document here</p>
<p>AI Act Working Group</p>	<p>Galway, Ireland</p>	<p>The objective of this group is to give an overview and further reading for the EU AI Act – drafted in February 2021 [92] , has been extensively discussed in the EU Council and Parliament [66], is due for final agreement in late 2023, and will be enforced by the end of 2025.</p> <p>The AI Act is based on broad horizontal classifications of risks, focusing on steps to mitigate the highest risks and forbid some use cases. The goal is to protect human rights, public safety, and environment, from misuse, unreliable operation, or bias of an AI system.</p> <p>Reading the AI ACT, the preliminaries explain the legal basis, scope, and concepts, then there are sections (Articles) with specific requirements on risk management, data quality, oversight, operational monitoring, documentation, etc.</p> <p>Requirements are most strict for high-risk scenarios, which are broadly defined but subject to case-by-case review by national Notified Bodies before deployment.</p> <p>AI producers and deployers are subject to significant fines for breaking the rules and thereby harming EU citizens, no matter where in the world they are (similar approach to GDPR). Harmonised standards are under development to operationalize the rules, for product conformance.</p>
<p>AI characterization working group</p>	<p>Galway, Ireland</p>	<p>The objective of this group is to discuss the subject of AI Trustworthiness Characterization</p>



4.4 Skills

Experience name	Origin	Short description
MSc IN LEADERSHIP & INNOVATION IN THE PUBLIC SECTOR	Donegal (Ireland)	<p>This course aims to deliver a range of learning experiences that empower participants to develop their knowledge, understanding and applied skills in the field of innovation and transformational change within the delivery of public services.</p> <p>It aims to challenge participants to move beyond the passive absorption of information through critical analysis and reflection and towards innovative, strategic and transformational management initiatives within their sponsoring organization.</p>
ICT Competence Support and Development Ecosystem (ICTEko)	City of Hämeenlinna (Finland)	<p>The ICT Competence Support and Development Ecosystem (ICTEko) project is a network research and development project in the seven Finnish cities (Hämeenlinna, Lahti, Porvoo, Tampere, Turku, Oulu and Vantaa) in 2020-2021.</p> <p>The project addressed:</p> <ul style="list-style-type: none"> • ICT competence mapping in the municipal contexts • Optimization of digital support • Recommendations for information management • Evaluation of the effectiveness of ICT support • Assessment of the competence levels <p>The project was managed by the City of Hämeenlinna and funded by the Ministry of Finance (Digitalisation incentive scheme).</p> <p>It has mapped the needs and the matching forms of support for the ICT competences in modern information work under a municipal employer.</p>



<p>Open Data, Linked Data, Data Analytics and Data Visualisation Training</p>	<p>Galway, Ireland</p>	<p>The Insight Centre for Data Analytics at the University of Galway runs various training courses, workshops and hackathons. UoG's researchers, in addition to an extensive inventory of skills and materials related to Data Analytics, have Open Data Institute certification to deliver ODI courses. Currently, UoG, together with UrbanTide and funded by DPER, provides a set of training courses to members of different departments of the Irish government in the area of Open and Linked Data, Data Analytics and Data Visualisation. UoG has been hosting public Open Data Hackathons in partnership with Irish Statistics Office – Apps4Gaps and Alice Perry Hackathon.</p>
<p>eGov, NLP, IoT, Smart Manufacturing, Applied Technologies</p>	<p>Galway, Ireland</p>	<p>The Insight Centre for Data Analytics at University of Galway offers a wide range of consultancy, events, hackathons and training sessions corresponding to different research units hosted at UoG. That includes areas of eGovernment, Natural Language Processing, Artificial Intelligence, Ethical AI, Smart Manufacturing, Green and Sustainable IT, Internet of things and Applied Technologies.</p>
<p>Smart Manufacturing</p>	<p>Galway, Ireland</p>	<p>Insight centre can offer skills related to smart manufacturing and industry 4.0. The combination of transformer networks, attention-based modelling, hybrid neural networks, and generative modelling offers a robust set of skills to tackle the challenges of performing machine failure checks and estimating the remaining useful lives of complex mechanical systems. These techniques enable accurate predictions, early detection of anomalies, and informed decision-making for maintenance and operational optimization.</p>
<p>Decentralized Data sharing</p>	<p>Galway, Ireland</p>	<p>The Insight Centre for Data Analytics at University of Galway offers skills of using advanced technologies for decentralized data sharing of dataspace empowering by enabled technologies, i.e., blockchain, decentralized file system, semantic web and knowledge representation, federated learning, and peer-to-peer networks in B5G. Furthermore, Insight can offer skill in how dataspace in the sky in which drones technology has the capability to support data sharing in real time in decentralized fashion over many applications such as Precision agriculture, Disaster response, Environmental monitoring.</p>



<p>Knowledge Graph for Data Sharing</p>	<p>Galway, Ireland</p>	<p>Insight can offer the skills and expertise in knowledge graph for data sharing that is part of project DS4EU funded by the European Union. Knowledge graph for data sharing is a transformative technology that offers a multitude of skills and advantages for efficient and effective data sharing. It enables seamless integration of diverse data sources and formats, representing information in a structured and meaningful manner.</p>
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Annex 1 – Experiences

Artificial Intelligence chatbots

<p>General information</p> <ul style="list-style-type: none"> - Producing region: Derry and Strabane (Northern Ireland) / Västernorrland (Sweden) – EMERGREEN project - Producing organisation: Derry and Strabane District Council / Regional Council Västernorrland - Contact person: Jose Manuel San Emeterio (ERNACT)
<p>Category</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Digital technologies <input type="checkbox"/> Delivery models <input type="checkbox"/> Procurement of innovative solutions <input type="checkbox"/> Skills
<p>Brief description</p> <p>A chatbot is a computer program or an artificial intelligence which conducts a conversation via auditory or textual methods. Such programs are often designed to convincingly simulate how a human would behave as a conversational partner.</p> <p>Artificial intelligence powered chatbots use Natural Language Processing (NLP) and Machine Learning (ML) to better understand human needs and provide a more natural, near-human level communication.</p>
<p>Main fields of application and impact generated</p> <p>In the EMERGREEN project, AI-Chatbots were implemented to provide 2 services:</p> <ul style="list-style-type: none"> • Zero waste circular management service (Derry and Strabane District Council) <p>A service to change public behaviour towards achieving a zero-waste circular district. The service particularly will:</p> <p>1) Improve accessibility to sustainability information for members of the public and businesses, including those in peripheral areas; 2) Improve communications on Waste and Recycling services through digital offerings; and 3) Better deliver the service to the public with reduced staff overheads (reduced number of calls into agents).</p> <p>This service uses chatbot technologies providing an online response service on information regarding waste, bin collecting, recycling services, etc. 24 hours a day 7 days a week. It is also aimed at helping people report issues</p>



more easily and freeing council staff from dealing with mundane enquiries concentrating instead on more complex questions.

• **Green growth advisory services (Regional Council Västernorrland)**

A service to assist advisors in their task of providing advice to the community to be more energy efficient and solve the issue they have to reach a wider audience.

In particular, the new service uses chatbot technologies to: 1) Improve communications on energy and climate with businesses and the general public; and 2) Improve the public awareness of the available services, grants and overall efficiency of different energy options. Previously, this service is delivered via phone calls and face to face meetings with part-time advisors and thus limiting its availability.

Transferability

The chatbot technologies in EMERGREEN are easily transferable. They are open source and the main work required would come from the development of the knowledge base to train the chatbot.

Other info

Decentralized data sharing

Decentralized data sharing revolutionizes traditional data exchange models by distributing data and control across multiple nodes, eliminating the need for central authority. The collaborative approach relies on cutting-edge technologies such as Blockchain, ensuring tamper-resistant and transparent data transactions, while Federated Learning enables model training without exposing raw data, preserving privacy and promoting collaboration. IFIPS and P2P networks provide decentralized sharing capabilities, enhancing data availability and robustness. Semantic Web technologies facilitate data interoperability and understanding, allowing machines to comprehend data relationships effectively. The technologies create a secure, privacy-conscious, and collaborative data-sharing ecosystem, empowering users to access, share, and utilize information democratised and transparently.

<https://emergreen.interreg-npa.eu/outputs-and-results/>



Omaidea digital participation platform

General information
<ul style="list-style-type: none"> - Producing region: South Savo - Producing organisation: University of Helsinki, Ruralia Institute - Contact person: Toni Rynänen and Päivi Pylkkänen
Category
<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Digital technologies <input type="checkbox"/> Delivery models <input type="checkbox"/> Procurement of innovative solutions <input type="checkbox"/> Skills
Brief description
<p>Omaidea (www.omaidea.fi, in English "Own idea") is a digital participation platform to support citizen engagement with different digital participation tools (surveys, idea collection and supporting, discussion forum etc.) on versatile topics. The University of Helsinki, Ruralia Institute, developed the digital participation service to address the overall aim of the EMERGREEN project to promote greener communities in remote areas. The platform was developed in partnership with the local stakeholders such as the associate partner, the City of Mikkeli.</p> <p>The platform addresses several interrelated objectives:</p> <ul style="list-style-type: none"> • To promote innovative and versatile citizen participation in the City of Mikkeli and the region of South Savo, especially in remote and sparsely populated areas. • To raise awareness on sustainability issues, circular economy and climate change, • To engage citizens to actively contribute to and promote everyday sustainability solutions and green lifestyles. <p>The Omaidea platform was developed, tested and assessed in several sustainability related participation processes during the EMERGREEN project between the years 2019 and 2022.</p> <p>Omaidea is based on Decidim open source, freely modifiable software (programming language: Ruby on Rails) for citizen participation https://decidim.org. It is a web-based software and can be accessed on any device or operating system. Decidim was selected due to its highly modifiable, modular nature, low cost of technical support (launching, updating, and maintaining the service), and user friendliness from the end-users' perspective.</p>



Main fields of application and impact generated

- To date, the Omaidea platform has been used to spark thinking and action around circular economy, climate change, food systems and food waste as well as novel foods such as cellular agriculture.
- The platform has contributed to increased awareness on sustainability issues in the City of Mikkeli and beyond.
- Experiences from launching, testing and implementing the Omaidea benefit the City of Mikkeli and the region of South Savo in assessing and deciding on future digital participation pathways.
- In addition, Omaidea being a general brand, it is freely available for organisations in the region interested in testing this novel digital participation tool.
- The associate partner, city of Mikkeli youth services reported that facilitating the possibility of making young people's voice heard in Mikkeli has already led to cumulative positive effects.
- The City of Mikkeli youth services has worked with the results of the idea competition as guidelines of the climate work with young people. Also, a climate awareness group has been founded around the youth taking part in the Omaidea participation pilot.

Transferability

Most public services need novel and digital means for citizen engagement for which a Decidim based solution is one considerable and transferable alternative for many contexts.

The Decidim software behind the Omaidea platform is open, freely modifiable and free of charge. See the documentation and the Decidim development community: <https://github.com/decidim/decidim>

For the Omaidea: <https://github.com/Metatavu/Ruralia-Decidim>

See also Decidim administration manual available at:

https://decidim.org/pdf/Decidim_AdminManual_EN_0.10.pdf

The global community developing Decidim is growing. Major cities in Europe have utilised Decidim-based application is participatory budgeting with positive experiences, the software is being developed and novel modules of tools are being developed. The open access participation tools may be clearly more advanced soon and attract therefore increasing amounts of young people to try these solutions. Including technologies such as the AR and VR, the applications may transform radically citizen participation in remote and rural areas in the future.



Other info

<https://omaidea.fi/>

<https://omaidea.fi/?locale=en>

NB: The platform is targeting the Finnish speaking audiences. Although there are some indicative translations into English, it should be noted that the English content is not detailed or up to date.

The assessment report of Omaidea and the other digital technologies developed during EMERGREEN project by its partners in five countries, will be available through a *Transnational platform* service shortly (platform under construction by the project partner NUIG).

Digitization Guide

General information

- **Producing region: Västernorrland county**
- **Producing organisation: Association of Local Authorities Västernorrland**
- **Contact person: Osman Saidabdala**

Category

- Digital technologies**
- Delivery models**
- Procurement of innovative solutions**
- Skills**

Brief description

The Association of Local Authorities in Västernorrland currently operates the platform with support from the Västernorrland Region, the European Regional Development Fund and the eight municipalities included in eSamverkan 2020-2022; Härnösand, Kramfors, Nordanstig, Sollefteå, Sundsvall, Timrå, Ånge and Örnsköldsvik.

A platform for collaboration and exchange of experience for those who work with digitizing welfare. Here you can get tips on concrete methods and tools to use and be inspired by other people's solutions to the same problems that your organization is currently facing.

You can choose challenges within your business area, see solutions and contribute with your own examples. The digitization guide makes your digitization journey easier!

Based on the municipalities' area of activity, there are various challenges where you as an entrepreneur can also contribute with solution proposals.

By spreading knowledge of the challenges of public activities, we want the region's business community (SME) to be able to expand its market and increase its ability to innovate. Both new innovative services and existing solutions that could solve a municipal operational challenge are interesting.



All municipalities within e-collaboration need automation and digitization of their operations, but the conditions for doing this look very different. The digitization guide highlights current challenges and shows various solutions with ready-made delivery documents that contain conditions for digital development in the public sector and examples of how the challenges of operations can be met by changing working methods. The guide describes the challenge, goal image, how it affects horizontal criteria, need for external services, solution proposals and its value internal and external benefit, possible architecture map, usability test and expected results.

In the initial phase, the Digitization Guide has concentrated on disseminating knowledge and experiences around the following eight currently very current challenges in the guide.

- 1) Prerequisites for automations
- 2) Secure digital communication (SDK)
- 3) API strategy (system integration)
- 4) Cohesive digital service within the school (school portal)
- 5) Digital competence phase 1
- 6) Case management process
- 7) Digital exclusion
- 8) Digital signing

Main fields of application and impact generated

Overall goal: That the municipal activities have a better ability to drive change work with the support of digitization.

- We contribute to the fulfilment of special goals 1- New digital services are established and existing ones are developed so that accessibility to private and public services is improved by establishing a completely new, hopefully national service, which in turn will contribute to the digital transformation so that the accessibility of the public service is reformed.
- The project indirectly contributes to special goal 2 - The use of e-services will increase, especially in the groups in society that use e-services to a lesser extent and the new technology as the Digitization Guide will contribute with method support for how the municipal activities can increase the use of new technologies and e-services.

Goal:

- That the municipal activities that are developed with the support of digitalisation can increase the quality of services offered, become more efficient without becoming cost-driving.
- That Digitaliseringsguiden.se is the leading and most easy-to-use toolbox for helping small and medium-sized municipalities get started and carry out their digitization journey.
- To develop a service / platform (Digitaliseringsguiden.se) that supports managers and employees to be used in the development / renewal of a business in an orderly user flow.
- That people active in the public sector, who do not naturally have contact with examples of the different potentials of digitalisation, gain an increased understanding of and concrete guides to how to use the opportunities that exist within and around digitalisation in their operations.



Expected results at the end of the project

- That Digitaliseringsguiden.se is the leading and most easy-to-use toolbox for helping small and medium-sized municipalities get started and carry out their digitization journey.
- To have developed a service / platform (Digitaliseringsguiden.se) that supports managers and employees to be used in the development / renewal of a business in an orderly user flow.
- That the general shift for digital maturity that has begun in many municipalities after the e-Collaboration project has been further affected.
- **Expected effect in the long term**
- That the municipal activities that are developed with the support of digitalisation can increase the quality of services offered, become more efficient without becoming cost-driving.
- That the municipal activities have a better ability to drive change work with the support of digitization.
- That the region's business community has expanded its market and increased its ability to innovate by gaining early knowledge of the challenges of public activities.

Transferability

The working group within the digitalisation guide discussed the challenge of digital competence and digital leadership, and adopted a solution proposal such as:

Digital innovation platform,

Digidelcenter, Digital salon (meeting place where you develop your skills in digital technology)

E-identification

Course menu for seniors

Based on the results from the project digitization guide, we would like to focus on the challenge of digital exclusion and digital competence. With the goal that the elderly, new arrivals and people with disabilities get, based on their conditions, access to digital public service that facilitates their everyday life and creates a high level of trust and confidence in the public administration.

The pre-study will focus on digital competence and digital inclusion to reduce digital exclusion and how to build the capacity of the public sector and prepare it to play this important role in improving services aimed at the target group. The pre-study is limited to digital services aimed at society and the general public. The target group is the elderly, new arrivals and people with disabilities and other citizens who suffer from digital exclusion. When it comes to innovation, in addition to digital skills aspects such as legislation, and infrastructure are important, but this pre-study does not include laws and technical infrastructure. Stakeholders are e-collaboration municipalities and possibly national and regional actors in the county.

Other info

Link to the digitization guide

<https://digitaliseringsguiden.se/>



Improving Psychological Health & Safety in Health Care Workers through Technology Based Support Project

General information

- **Producing region:** Newfoundland and Labrador, Canada
- **Producing organisation:** Eastern Health Regional Health Authority
- **Contact person:** Randy Follett

Category

- Digital technologies**
- Delivery models**
- Procurement of innovative solutions**
- Skills**

Brief description

This initiative undertook a pilot tested approach to improving mental health and safety through technology-based support. Eastern Health, a local regional health authority, is leading the project to determine if technology-based support increases employee knowledge and uptake of psychological support services, in turn improving employee wellness factors and organizational healthy workplace indicators.

Eastern Health is the largest employer in Newfoundland and Labrador, employing almost 13, 0000 employees, 82% of them are women, about 10% come from rural parts of the eastern region. The organization currently has below average engagement scores and significant rates of sick leave and absenteeism. This project aims to target all employees within the organization.

This three-year project involves the development, implementation and evaluation of application-based technology (from personal technology devices) which will incorporate internal and external supports to the organization as well as a built-in peer "chat" function, allowing employees to gain timely and appropriate support and information about what is available for them.

IBM is a development partner in this project.

Main fields of application and impact generated

This project began in March 2019 and is scheduled to end in June 2022. Preliminary findings in this project have been impressive. The Employee Virtual Assistant (EVA) software developed to assist in enabling psychological support services for Eastern Health workers was launched and in place just before the COVID virus arrived in the Province. This software uses Artificial Intelligence and was developed in cooperation with IBM. This timing kept the project on schedule and also enabled an immediate test based on the impact of the virus on Eastern Health workers. Resultantly, there was higher



than expected engagement in the developed Employee Virtual Assistant (EVA).

Transferability

There is significant interest in testing and early adoption of the tool beyond Eastern Health to other Health Boards in the province and beyond.

Other info

<https://www.nlwic.ca/improving-psychological-health-safety-in-health-care-workers-through-technology-based-support-project-plan/>

Social VR platforms

General information

- **Producing region: Galway, Ireland**
- **Producing organisation: Insight Centre for Data Analytics, University of Galway**
- **Contact person: Lukasz Porwol (Insight)**

Category

- Digital technologies**
- Delivery models**
- Procurement of innovative solutions**
- Skills**

Brief description

Social VR collaborative platforms allow for hosting multi-user immersive experiences inside custom made virtual venues. Those venues can be designed to be an exact digital twin or similar to the real space or can be an abstract or future representations. Users who access the venues using next-gen immersive VR headsets can experience highly interactive sessions where they can be spatially aware while exploring and manipulating environment with their hands. The spatial, stereoscopic vision combined with 360-spatial sound provides close-to-real experience.

Main fields of application and impact generated

In the VR-Dialogue project, Social VR technologies were implemented to provide the following services:

• **Library training services (Boston, USA)**

A service designed to train librarians in response to unexpected situations they may face while at reception desk. That includes situations where specific individuals are lost, terrified or angry (for instance persons with Alzheimer syndrome). The trainee is exposed to a simulated library venue where they first embark on virtual training and the progress to a role-playing



part. Apart from traditional visual analytics our platform allowed for telemetric data collection for future research and potential performance evaluations.

• **Conscious and unconscious biases study (Ireland, USA, Israel)**

A service was designed to support an international study on conscious and unconscious biases in communication in virtual reality. The study focused on the transferability of human biases from real world to group interaction in VR. The study was hosted in virtual venues and group activities were organised where participants discussed and collaborated around climate change.

Transferability

The social VR technologies in VR-Dialogue are easily transferable. The solution utilized. The solution developed is open-source and hosted in a private cloud space. The platform can be adapted to many different scenarios and new venues and use-cases can be implemented on demand.

Other info

Virtual Library venue access: <https://hubs.mozilla.com/YVHiK2W/simmons>
<https://dl.acm.org/doi/10.1145/3463677.3463747>
<https://dl.acm.org/doi/10.1145/3463677.3463746>

Data Platforms

General information

- **Producing region: Galway, Ireland**
- **Producing organisation: Insight Centre for Data Analytics, University of Galway**
- **Contact person: Lukasz Porwol (Insight)**

Category

- Digital technologies**
- Delivery models**
- Procurement of innovative solutions**
- Skills**

Brief description

A data platform is usually understood as the central repository and processing hub for a data ecosystem to address the issue of data silos and processing diverse data. The platform serves as an integrative component for multiple, heterogeneous data sources. Data platform can leverage a federation of tools and implement ELT (Extract, Load, Transform) or ETL data pipeline (Extract, Transform, Load) principle.



Main fields of application and impact generated

In the Sharepair project, Data Platform technologies were implemented to provide an Open Repair Data platform. One of the major objectives and tasks in the Sharepair project was to develop an integrated dataspace for repair information collected as part of the project. A team of National University of Galway in Ireland took the lead in this project. The actual dataspace was given the name 'Open Repair Dataspace Platform', and is already being used by several 'clients', meaning that different online tools and dashboards are using data coming from this ORDP.

The scaling goals were among others:

- to include 'data types' other than registrations of repairs done, like data about 'repair organisations', 'repair manuals' and '3D printing files'
- to have a real-time and open dataspace that can be queried by anyone or any tool or website, to retrieve specific data

The current version of the ORDP, at the end of the Sharepair project, includes the following data sources:

- Open Repair Alliance (ORA) dataset of repairs
- Thingiverse dataset of 3D printing guides
- iFixit dataset of repair guides
- MyMinifactory dataset of 3D printing guides
- Open Repair Data Standard (ORDS)
- Repair Connects dataset of repairs
- Repair Maps dataset of repair locations

Transferability

The underlying infrastructure and framework can be adapted to different data integration use-cases and new data models can be leveraged to linked heterogenous data.

Other info

<https://www.sharepair.org/digital-tools-for-repair/open-repair-data-platform-ordp>



1.1 Small Business Innovation Research (SBIR)

General information
<ul style="list-style-type: none"> - Producing region: Ireland - Producing organisation: Enterprise Ireland - Contact person: Jose Manuel San Emeterio (ERNACT)
Category
<ul style="list-style-type: none"> <input type="checkbox"/> Digital technologies <input type="checkbox"/> Delivery models <input checked="" type="checkbox"/> Procurement of innovative solutions <input type="checkbox"/> Skills
Brief description
<p>SBIR is a mechanism which enables public sector to connect with innovative ideas and technology businesses to provide innovative solutions for specific challenges.</p> <p>SBIR's aim is to drive innovation across all sections of the Irish Public Sector via robust engagement with technology rich companies and organisations, through competitive challenges. SBIR itself is underpinned by a sharing of both risks and benefits between Contracting Organisations and Suppliers. SBIR falls under the category of pre-commercial procurement (PCP). PCP as defined by the European Union, involves the purchase of research by a Government entity, which is undertaken with the objective of stimulating innovation that the contracting authority or some other party may benefit from at a later stage, when goods or services are not currently available or developed from the outcomes of the research.</p> <p>The main stakeholders and beneficiaries are the public sector and the SMEs:</p> <p>1- Through SBIR the public sector can:</p> <ul style="list-style-type: none"> • Identify innovative solutions by reaching out to organisations from different sectors including small and emerging businesses. <ul style="list-style-type: none"> • Create new technical solutions through accelerated technology development, whilst risk is reduced through a phased development programme. • Provide applicants with a transparent, competitive and reliable source of early-stage funding. <p>2- Through SBIR the SMEs can:</p> <ul style="list-style-type: none"> • Compete for each demand driven project in a transparent manner. • Demonstrate a route to market for their solution (SBIR is particularly suited to small and medium-sized business, as contracts are of relatively low value and operate in short timescales).



- Focus on specific identified needs, increasing the chance of exploitation as developments are 100% funded – it is not a government grant.
- Retain the intellectual property generated from the project (with certain rights of use retained by the contracting department).

An SBIR Challenge is divided into two Phases:

- Phase 1 – up to 6 companies undertake a technical feasibility study to understand the challenge and identify a potential solution to solve the problem
- Phase 2 – a smaller number of companies prototype a specific project, through extensive R&D

Main fields of application and impact generated

The fields of application are varied. In 2020 Enterprise Ireland's approved SBIR Challenges for 2020 were:

- **Climate Action - Environmental Protection Agency Innovating a circular economy for soft plastic waste in Ireland**

This Challenge is seeking solutions to counter the problem of plastic waste and look at opportunities for closed-loop reuse systems, with an initial focus on reducing plastic waste from school lunches. The goal for this Challenge is to reduce the carbon footprint of schools by cutting plastic waste generation. Total fund €240K.

- **Health - Mater Misericordiae University Hospital and National Orthopaedic Hospital Cappagh as part of Ireland East Hospital Group. Reducing the incidence and impact of inpatient falls within the hospital**

This challenge aims to address the prediction, detection and prevention of falls in the Mater Hospital initially, with potential to extend a solution nationally. Total fund €200K.

- **Health - Tallaght University Hospital. Improving the care of, and empowering, Chronic Obstructive Pulmonary Disease (COPD) patients in the community.**

Tallaght University Hospital is seeking solutions to improve COPD patient self-management and incentivise affected patients to take control of their health. Total fund €200K.

- **Biodiversity - Marine Institute Innovative solutions to map coastal seaweed resources in Ireland**

Seaweed is an underutilised natural resource, and a technology-based solution is needed to enable future determination of its distribution in inter-tidal areas across Ireland. Total fund €300K.



- **Transport - National Transport Authority. Vehicle Capacity Information for bus and coach passengers with a focus on improved accessibility**

The Challenge is seeking innovative solutions to encourage and support mobility impaired passengers when using public transport in Ireland. Total fund €200K.

A survey launched in 2018 to 42 SMEs who were awarded funding in previous Challenges shows that 50,000 users are benefiting from SBIR-funded innovations in Ireland. The surveyed companies report 27 new jobs created and a further 88 existing jobs retained. More than four out of five (84%) companies have managed to leverage additional funding as a direct result of the SBIR Challenge. Almost two-thirds (64%) of innovations are still in the pre-commercial phase, so these figures are expected to increase as the companies further develop and scale their product or service.

Transferability

This approach has a lot of potential within the INNOCAP project since it can be applied to find and test solutions that provide response to real challenges of the public sector.

Example of application: a public body/sectoral agency can launch a challenge focused in providing concrete solution for a public service. The digital start-ups/SMEs can apply to provide real solutions to that need. The model will support the deployment of this innovative solutions sharing the benefits for both the digital providers and the final users receiving the improved services.

Other info

www.sbirireland.ie

[SBIR Guidance for Public Sector](#)



KEINO competence Centre

General information

- **Producing region: Finland**
- **Producing organisation: KEINO Competence Centre network**
- **Contact person: Secondary informants UH Ruralia Institute, Toni Ryyänen and Päivi Pylkkänen**

Category

- Digital technologies
- Delivery models
- Procurement of innovative solutions
- Skills

Brief description

[KEINO](#), in English “Means” is a networked Competence Centre founded in 2018 to increase sustainable and innovative public procurement. KEINO aims to improve the effectiveness and quality of public procurement and public services.

The main objectives are:

- increasing the number of innovative and sustainable procurements in Finland,
- public procurement is recognized and actively used as a management tool and
- contracting entities openly disseminate information on their experiences and learn from one another.

The founding members of KEINO were Sustainable Development Company Motiva Ltd, the Association of Finnish Local and Regional Authorities, VTT Technical Research Centre of Finland Ltd, The Finnish Funding Agency for Innovation – Business Finland, the Finnish Environment Institute SYKE, Hansel Ltd, KL-Kuntahankinnat Ltd and the Finnish Innovation Fund Sitra. Now the first six are still part of the consortium and are responsible for the operation and co-development of the centre.

The UH, Ruralia Institute is not directly associated with the KEINO knowledge centre but identified it as an inspiring reference and information source for the INNOCAP project.



KEINO Competence Centre's are steered and funded by the Ministry of Economic Affairs and Employment.

Main fields of application and impact generated

Since its launch, the KEINO knowledge centre has offered guidance and information on:

- Strategic management of public procuring
- Developing public procurement competence
- Cooperation and networking in public procurement

Transferability

KEINO provides concepts, models and networks that may potentially interest and inspire the INNOCAP partners. KEINO provides information on Finnish best practices and expertise. The web resources include a search engine to find examples of sustainable and/or innovative procurements. As KEINO targets primarily the Finnish public contracting authorities with the development of sustainable and innovative procurement, the transferability of KEINO resources must be assessed on a case-by-case basis.

Other info

<https://www.hankintakeino.fi/en>

together with other contents accessible in English

<https://www.hankintakeino.fi/sv>

together with other contents accessible in Swedish



Co-production technology (IMPROVE)

General information
<ul style="list-style-type: none"> - Producing region: Ireland - Producing organisation: ERNACT (IMPROVE project) - Contact person: Jose Manuel San Emeterio (ERNACT)
Category
<ul style="list-style-type: none"> <input type="checkbox"/> Digital technologies <input checked="" type="checkbox"/> Delivery models <input type="checkbox"/> Procurement of innovative solutions <input type="checkbox"/> Skills
Brief description
<p>Methodology developed within the IMPROVE project to guide regions in the process of co-producing new services with their communities in a living lab environment helping them to:</p> <ul style="list-style-type: none"> • Establish the innovative living lab ecosystem formed by all the relevant stakeholders • Effectively carry out the needed adaptation and organizational change in each stakeholder • Provide the public services providers (civil servants, community managers, volunteers, social enterprises, etc) with the necessary tools and skills to act as local champions leading the process of co-producing the new services • Engage and involve the community • Co-produce user-centred, inclusive, responsive and transparent services <p>The methodology includes a transnational dimension and also provides guidance for the establishment of the IMPROVE transboundary living lab and how the participating regions can have access to other centres of knowledge.</p>
Main fields of application and impact generated
<p>This methodology provides a framework to guide those organisations that want to involve their communities in the definition and provision of the public services.</p> <p>The framework has been defined flexible enough in order to be adapted to the different contexts and services areas.</p> <p>It presents a 5-step approach and stress on the importance of empowering intermediary facilitators (called local champions) as key actors in the process. These local champions can include civil servants, community</p>



managers, volunteers, social enterprises workers, planners and others depending on the service provided.

In the case of IMPROVE the methodology was applied engaging with almost 100 local champions.

eCare/Health services

- **eCare/eHealth Communication service (North Karelia):** a service to connect citizens, public sector actors, companies and associations making the process more inclusive, accessible and interactive moving from the current top-down approach to a new way of co-produce and organize the services.
- **Safer and secure telecare services (Västernorrland):** a service oriented to making use of new ICT technologies (i.e. cameras, sensors, etc) to help carers feel safer and secure when supporting the growing number of elderly and disabled people, especially during the night or under bad weather conditions.
- **eHealth Messaging services (Sogn og Fjordane):** a service that uses e-messaging to effectively communicate between the patient and different service providers.

Spatial planning services

- **Spatial Planning Service and Community Participation (Donegal):** this is a step away from the traditional “Open for Public Consultation” time period, and into the realm of ongoing public contribution of local planning issues and the constant gathering of those issues in an online Spatial GIS application.
- **eParticipation Spatial Planning Service (Borgarbyggð):** This service will be designed to promote citizen participation and collaborative problem solving in municipality governance. It will be based on a website that allows citizens to submit policy proposals to the municipal government. These ideas would be publicly accessible and can be debated by other participants and revised.
- **ePlanning Service (Derry and Strabane):** A service to enhance the level and manner of public engagement at key stages of the Local Development Plan process in a format that will help to ensure that such engagement and feedback is actively utilized to steer and shape the progress of the plan preparation.

More info can be accessed [here](#).

Transferability

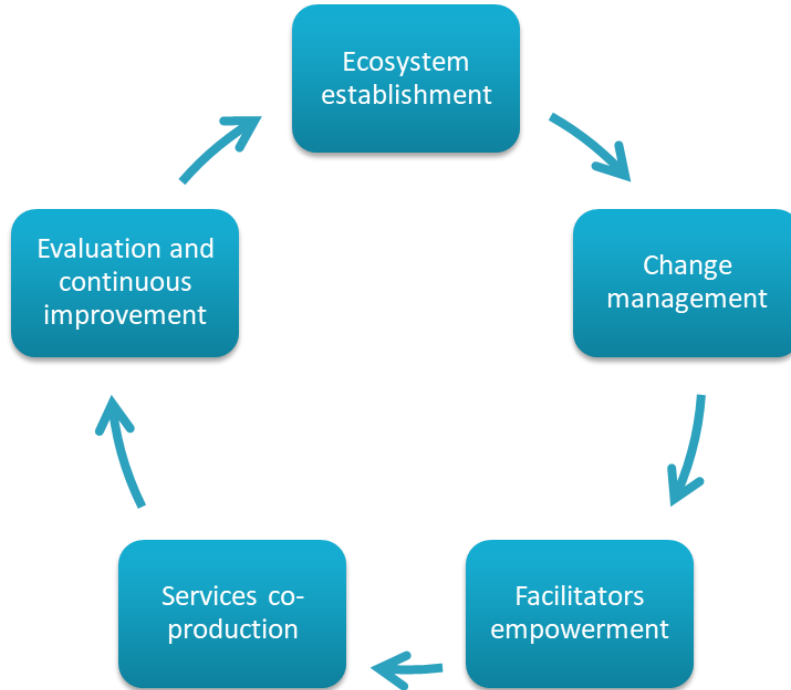
The methodology is open and free of use for whoever is interested in the co-production of public services with their communities.

The methodology can be accessed and downloaded in the IMPROVE website through the following link: [IMPROVE CO-PRODUCTION METHODOLOGY](#)

Other info



Improve co-production approach





Innovation as a Service (IaaS)

General information
<ul style="list-style-type: none"> - Producing region: Border Region (Ireland) - Producing organisation: ERNACT - Contact person: Jose Manuel San Emeterio (ERNACT)
Category
<ul style="list-style-type: none"> <input type="checkbox"/> Digital technologies <input checked="" type="checkbox"/> Delivery models <input type="checkbox"/> Procurement of innovative solutions <input type="checkbox"/> Skills
Brief description
<p>The Innovation as a Service (IaaS) action is aimed to increase the uptake of disruptive technology solutions by SMEs in the Irish Border region to accelerate their competitiveness and innovation levels. This is key to enabling SMEs to address the twin threats of Brexit and Covid-19. The unique approach of the project is to use sophisticated digital collaboration services to better network and connect the Border region's growing network of innovation hubs to technology providers (universities and institutes of technology) across the Border and West regions in Ireland.</p>
Main fields of application and impact generated
<p>The unique approach of the project is to use sophisticated digital collaboration services to better network and connect the Border region's growing network of innovation hubs to technology providers (universities and institutes of technology) across the Border and West regions. The action brings initially 12 innovation hubs and 9 technology providers.</p> <p>The digital collaboration tools are selected on their ability to enable effective and enhanced collaboration between the three groups (SMEs, knowledge providers and hubs) in an innovation support environment. They include tools for visual modelling of enterprise processes, display of knowledge provider technology prototypes and facilities, case management, virtual meetings, etc.</p> <p>The initial target group are manufacturing SMEs in the Border region. The project started recently and the work at the moment is focused on the development of the platform.</p> <p>The project's value brought to entrepreneurs and senior business managers in manufacturing SMEs in the Border region is that they can have the same access to Ireland's most advanced digital solutions, technology and knowhow from their own factory premises or local area as if they were located in Dublin, Galway or Cork.</p>



This will resonate strongly with them as they experience on a daily basis the challenges of initiating productivity drives from peripheral border areas. No longer will they have to take a day out of their time-poor schedules to visit the university in Galway or Dublin to look at possible innovative solutions. They may have already decided not to go as they won't have the time afterwards and the human skills to select a promising solution, pilot it and successfully integrate it into their manufacturing processes. This can take months.

With the IaaS project and service, thanks to the wonder of Virtual Reality, the entrepreneur will be able to experience a variety of promising solutions from a range of universities and institutes of technology – without leaving their factory or local innovation hub.

Transferability

The IaaS approach can be easily replicated to target other recipients like the public sector.

It has a huge potential to upskill the public sector staff and find new delivery channels saving costs, increasing viability, improving use of scarce human resources, spanning distances and improving decision making processes.

Other info

<https://iaas.live/>



Regional Analytics Laboratory (RAnLab)

<p>General information</p> <ul style="list-style-type: none"> - Producing region: NL, Canada - Producing organisation: Harris Centre for Policy Development - Contact person: Randy Follett
<p>Category</p> <ul style="list-style-type: none"> <input type="checkbox"/> Digital technologies <input checked="" type="checkbox"/> Delivery models <input type="checkbox"/> Procurement of innovative solutions <input type="checkbox"/> Skills
<p>Brief description</p> <p>The Harris Centre Regional Analytics Laboratory (RAnLab) focuses on the use of regional economic and spatial analytics to quantitatively assess the capacity and sustainability of industries, labour markets and the population of places for the purpose of informing evidence-based policies for regional development.</p>
<p>Main fields of application and impact generated</p> <p>RAnLab has developed an operational geo-spatial supply chain and regional economic analytics model that can assess the impacts of any present or projected future changes in, demography, commodity prices, industries, labour markets, housing demands, services as well as the introduction or removal of industries /services from a region.</p> <p>The tool is modular and additional functions can be easily added. Analysis level and geographies dependent on data sources. All analytics follow accepted regional economic practices and Statistics Canada standards (e.g., NAIC, NOC, Statistics Canada databases and definitions)</p> <p>RAnLab provides practical and helpful tools that build capacity at the municipal level.</p> <ul style="list-style-type: none"> • 'Scenarios' and 'projections' are prioritized over 'predictions' • Help understand interconnections between indicators • Model the system <p>Two primary areas of model development.</p> <ul style="list-style-type: none"> • Demographic projections and Geo-spatial supply chain analysis



- Assess cost and benefits as well as socio-economic impacts of development policies on regional economies
- Analyse Labour Force Demand and Supply Issues

The two main models generate data and indicators important for comprehensive analysis as follows:

Demographic Modelling: Change in Population

- Both 'traditional' and bottom-up cohort survival demographic models
- Anticipate impacts of changes in births, deaths and migration upon housing, income, spending, etc.
- Future looking model

Supply Chain Analysis: Change in Economy

- Bottom-up (municipal-and industry-level) model of all economic demand and supply connections
- The tool is modular and additional functions can be easily added
- All analytics follow accepted regional economic practices and Statistics Canada standards (e.g. NAIC, NOC, Statistics Canada databases and definitions)
- Derive an array of indicators from high-resolution flow connection data
- Assess linkages between industries or locations
- Gap and opportunity analysis
- Present/current modelling context rather than future looking

Applications:

Demographic Model

Demographic Structure

- Dependency Ratio (Children and Seniors vs. Working Age)

Housing

- Tenure (Owners vs. Renters)
- Size (Number of bedrooms)
- Structure Type (Single detached houses vs. Others)

Income & Consumer Spending

- Source of income

Ageing Workforce

- Identify at risk skills and occupations



- Potential skill mismatches. High skilled new entrants vs. lower skill retirements
- Sector/tech disruption? Non-traditional workforce participants?

Supply Chain Model

Assess linkages between industries or locations

- Jobs or value to regional economy
- To what degree are regions connected economically within a community and neighbouring communities
- What industry/service inputs are available locally, regionally, provincially or imported?
- To what degree may industry outputs be used locally, provincially, nationally and internationally?
- Estimate indirect employment by location/sector

Gap and opportunity analysis

- Location quotient: Local concentration of industry
- Shift-share analysis: Compare growth at different spatial scales
- Local multipliers
- Direct, indirect and induced impacts

Transferability

RAnLab has developed an operational geo-spatial supply chain and regional economic analytics model that can assess the impacts of any present or projected future changes in, demography, commodity prices, industries, labour markets, housing demands, services as well as the introduction or removal of industries /services from a region.

The tool is modular and additional functions can be easily added. Analysis level and geographies dependent on data sources. All analytics follow accepted regional economic practices and Statistics Canada standards (e.g. NAIC, NOC, Statistics Canada databases and definitions). Local information and participation are critical for data validation and asking the right questions prior to analysis. Comprehensive analysis is important for identifying contributions, gaps and opportunities in local and regional economies.

The long-term goal is to have data available via online web application where communities and regions can access updated information and tools to assess opportunities and impacts of policies or strategies for development.



Other info

<https://www.mun.ca/harriscentre/whatwedo/ranlab/>



Bounce Health Innovation (BHI)

General information
<ul style="list-style-type: none"> - Producing region: NL, Canada - Producing organisation: TechNL - Contact person: Randy Follett
Category
<ul style="list-style-type: none"> <input type="checkbox"/> Digital technologies <input checked="" type="checkbox"/> Delivery models <input type="checkbox"/> Procurement of innovative solutions <input type="checkbox"/> Skills
Brief description
<p>Bounce Health Innovation (BHI) was launched in January 2018 as a result of increasing interest in health innovation, spurred from a series of open innovation networking events that connect frontline healthcare workers with developers, designers, patients, and entrepreneurs.</p> <p>BHI is a mini-cluster in medical technology composed of the following participating organizations: Eastern Health, Memorial University (the Memorial Centre for Entrepreneurship, and the Faculty of Medicine), Genesis, the Provincial Government, Newfoundland and Labrador Association of Technology and Innovation (NATI) and the Newfoundland and Labrador Centre for Health Information (NLCHI).</p> <p>BHI's mission is to accelerate the growth of the health innovation sector in Newfoundland and Labrador (NL) with a vision to help the province become the testbed for medical technology innovation in North America. BHI engages with and supports medical innovators and entrepreneurs by leveraging resources within a unique health innovation ecosystem.</p> <p>The BHI BOUNCE Lab is located in Memorial University's Faculty of Medicine and is a showcase open-concept co-working space used by the Bounce team, founder-clients and entrepreneurial students. The lab's location strategically positions it at the intersection of academia (Memorial University via MCE and the Faculty of Medicine), the health system (Eastern Health & NLCHI), industry (NATI and Genesis) and the Province of NL (Departments of Health and Community Services and Industry, Energy and Technology). The Bounce Lab is easily accessible during business hours on a drop-in or appointment basis. Hot-desking and private meeting rooms are readily available.</p> <p>Additionally, Eastern Health's Living Lab and NLCHI's DataLab provide the ideal clinical testing environment for early-stage technologies designed for the health sector.</p>
Main fields of application and impact generated
<p>The project's goal is to develop innovative medical technologies and tools. BHI is an ecosystem with well-defined processes and strategic vision, the</p>



capacity of continuous evolution through process improvement, and development of new opportunities.

During phase one of the project, BHI demonstrated the potential to establish a medical technology sector here in the province by supporting the rapid development of a health innovation ecosystem and supporting start-up companies. BHI supported the entrepreneurial community by hosting seven Hacking Health events and supported 11 entrepreneurial student work terms. Additionally, BHI unlocked the innovation potential within the health system through multi-level engagement and entrepreneurial mentorship through Memorial Centre for Entrepreneurship's (MCE) entrepreneur-in-residence and executive-in-residence. BHI created a physical collaboration space for early-stage entrepreneurs and start-ups (Bounce Lab) and provided early-stage funding opportunities via the Embryo grant program. BHI provided support to 31 entrepreneurs and 13 medtech startups.

BHI Expert Panel provides software, medical device design and executive medical technology advisors to entrepreneurs and innovators having progressed past the ideation stage. All will be available for easily accessible mini-contracts with clients of BHI to help with the early-stage development of their concept. The software support can include architecture design, code development, and consultant, as well as privacy & security assessments as required. The medical device designer will assist with technical planning, brainstorming, design, development, prototyping, and manufacture pre-planning. The executive medical technology advisors bring senior management experience, broad experience in operations, market development, general management, research and development, and clinical and regulatory strategy.

BHI assists with managing technology discovery processes through commercial launch and provides direct network connections to external markets and investors. Phase 2 has begun. The primary objective of the second phase of BHI is to support 50 startup projects and innovations in the medical technology sector. The secondary objective is to contribute to building the reputation of NL as the testbed for medical technologies in North America.

Monthly meetings are held with Eastern Health to address barriers to innovation and growth opportunities for local entrepreneurs; and ecosystem development through fostering collaboration and networking across a broad spectrum of organizations as well as participating in a variety of public and industry engagement opportunities.

Collectively, these objectives help diversify the economy while infusing innovation into the health system. This will result in an improved health system with better outcomes for the people of NL and will serve to attract external health innovators and stakeholders into the province.

Transferability

The concept can be transferred easily as long as there is a willingness of universities, private sector health innovators, and government to work together and to share experiences and knowledge.

The project would require a lead partner (TECH NL leads in NL) and resources would be required for some staffing and space, and organizational components. BHI is guided by each of the participating organizations: Eastern Health (EH), Memorial University, Genesis, Provincial Government and Newfoundland and Labrador Association of Technology Industries (NATI) and the Newfoundland and



Labrador Centre for Health Information (NLCHI). Each organization contributes resources that support activities aligned with the vision, mission and value proposition of BHI. Guidance is operationalized through a steering committee including representatives from each of the participating organizations. It is also supported by an advisory board with diverse representation from industry, community, government, health system and academia. Together, Eastern Health's Living Lab, NLCHI's DataLab and the BHI initiative represent an extremely synergistic and co-ordinated approach designed to establish a medical technology sector in the province. Partners in the BHI project may hold individual or company licences in some cases, however, since the goal of the project is to make an impact internationally, many of the partners (both private and public) may indeed be interested in partnering and sharing information. This is something to discuss as we work toward a capacity building idea.

Other info

<https://bounceinnovation.ca/>

<https://www.youtube.com/watch?v=USoCp7COyFc>

MSc IN LEADERSHIP & INNOVATION IN THE PUBLIC SECTOR

General information

- **Producing region: Donegal (Ireland)**
- **Producing organisation: Letterkenny Institute of Technology**
- **Contact person: Jose Manuel San Emeterio (ERNACT)**

Category

- Digital technologies
- Delivery models
- Procurement of innovative solutions
- Skills

Brief description

This course aims to deliver a range of learning experiences that empower participants to develop their knowledge, understanding and applied skills in the field of innovation and transformational change within the delivery of public services.

It aims to challenge participants to move beyond the passive absorption of information through critical analysis and reflection and towards innovative,



strategic and transformational management initiatives within their sponsoring organization.

This course has been developed by Letterkenny Institute of Technology and Ulster University, in collaboration with the Office of An Taoiseach and the Office of the First Minister and Deputy First Minister, and begins in January each year.

To date over 180 public service managers including Principal Officers, Assistant Principal Officers, Heads of Function and Heads of Technology from departments and agencies, including those listed below, have benefited from the programme.

Main fields of application and impact generated

The programme runs over 2 years and is designed to facilitate executives in the workplace. It comprises 6 taught modules (each module is block delivered over 2 days with additional delivery online) and a Research Project. The MSc in Leadership and Innovation in the Public Service has 6 knowledge disciplines central to underpinning the programme vision of developing innovating leaders. The programme includes the following modules:

- Context of Leadership, Innovation and Transformation
- Transformational Leadership
- Citizen Centric Policy Design
- Change and Cultural Management
- Digital Transformation and Shared Services
- Performance Management

Transferability

Although this is a specific programme run by LYIT in Donegal (Ireland) on a blended physical/online model, it can serve as a basis to be replicated in other places.

Another possibility is to go for a full online programme accessible targeted at transnational level.

Other info

https://www.lyit.ie/CourseDetails/D401/LY_BIMPS_M/Leadership&InnovationinthePublicSector



Virtual Reality Laboratory (VRLab)

General information
<ul style="list-style-type: none"> - Producing region: Galway, Ireland - Producing organisation: Insight Centre for Data Analytics, Univeristy of Galway - Contact person: Lukasz Porwol
Category
<ul style="list-style-type: none"> <input type="checkbox"/> Digital technologies <input checked="" type="checkbox"/> Delivery models <input type="checkbox"/> Procurement of innovative solutions <input type="checkbox"/> Skills
Brief description
<p>The Insight's VR-lab focuses on providing a space for researchers and representatives of business and public sector to engage with the state-of-the-art Virtual Reality and Augmented Reality Technologies. Visitors can engage with a variety of VR and AR hardware including a wide range of 3-Degree of Freedom and 6-DoF VR headsets as well as AR and 360 cameras.</p>
Main fields of application and impact generated
<p>VR-Lab has emerged from the COMPACT media convergence EU project and EPE (Education and Public Engagement) activities by Insight Centre from Data Analytics in Ireland.</p> <p>COMPACT has investigated novel communication technologies, including VR technologies. During the pandemics COMPACT hosted fully immersive European VR-symposia hosted in Virtual Reality as a pioneering effort. In 2019 Insight Centre for Data Analytics started an Immersive Classroom initiative where secondary schools could embark on Virtual Reality classes at University of Galway premises. Students could explore reconstructions of ancient sites as well as enjoy a lecture hall and a poster session where they could engage in direct conversations with researchers. Those efforts were focused on supporting greated engagements of students in STEM. In total over 400 students were engaged.</p> <p>VR-Lab got further expanded and capacity increased during the Public Link EU project when University of Galway hosted project partners in the lab and organised a series of workshops including VR Collaboration, AR Navigation and 3D assets scanning and production of 360 videos.</p>



Transferability

VR Lab has developed several socio-technical frameworks and approaches to building infrastructure and engaging with the representatives of public, education and business. Those frameworks include specific methods and setup of devices, software and digital assets that used in combination can serve a variety of use-cases. Those frameworks are transferable and can be adopted and deployed in different scenarios and venues.

Other info



ICT Competence Support and Development Ecosystem (ICTEko)

General information
<ul style="list-style-type: none"> - Producing region: Finland - Producing organisation: The City of Hämeenlinna (The coordinator for the ICTEko network project) - Contact person: Secondary informants, the UH, Ruralia Institute, Toni Rynnänen and Päivi Pylkkänen
Category
<ul style="list-style-type: none"> <input type="checkbox"/> Digital technologies <input checked="" type="checkbox"/> Delivery models <input type="checkbox"/> Procurement of innovative solutions <input checked="" type="checkbox"/> Skills
Brief description
<p>The ICT Competence Support and Development Ecosystem (ICTEko) project is a network research and development project in the seven Finnish cities (Hämeenlinna, Lahti, Porvoo, Tampere, Turku, Oulu and Vantaa) in 2020-2021.</p> <p>The project addressed:</p> <ul style="list-style-type: none"> • ICT competence mapping in the municipal contexts • Optimization of digital support • Recommendations for information management • Evaluation of the effectiveness of ICT support • Assessment of the competence levels <p>The project was managed by the City of Hämeenlinna and funded by the Ministry of Finance (Digitalisation incentive scheme).</p> <p>It has mapped the needs and the matching forms of support for the ICT competences in modern information work under a municipal employer.</p> <p>The UH, Ruralia Institute has not been directly associated with the ICTEko project but identified it as an inspiring reference for the INNOCAP project in the field of local public sector digital skills provision.</p>
Main fields of application and impact generated
<p>The ICTEko project's research and service design components produced a practice oriented ICT competence development game book (2021) that enables municipalities to:</p> <ul style="list-style-type: none"> • carry out digital capability assessments with selected groups of staff,



- implement the strengthening of effective digital skills and capabilities,
- create a local support system to help the staff make the most of digital tools in their work.

The game book addressed particularly the service area of education at the municipal level. However, its tools and approaches have also generalizable value for the local public sector digital capability assessment and enhancement.

Transferability

ICTeko project outputs such as the above-mentioned game book, are of potential interest to the INNOCAP partners, but the transferability is partially limited by the language barrier (accessible mainly in Finnish).

Other info

ICTeko network project web pages: <https://icteko.wordpress.com/>
(Accessible only in Finnish)

Despite the language barrier, the Association of Finnish Local and Regional Authorities, [Kuntaliitto](https://www.kuntaliitto.fi/), has materials and resources on the Finnish local public sector, including aspects of digitalization (in English and Swedish)

In English: <https://www.localfinland.fi/>

In Swedish <https://www.kommunforbundet.fi/>



Vaccination consent e-service and automation of e-service for consent

General information
<ul style="list-style-type: none"> - Producing region: Västernorrland - Producing organisation: ALAV & Örnsköldsviks kommun - Contact person: Osman Saidabdala, project manager EU projects
Category
<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Digital technologies <input type="checkbox"/> Delivery models <input type="checkbox"/> Procurement of innovative solutions <input checked="" type="checkbox"/> Skills
Brief description
<p>Digital technologies experience</p> <p>EU project “Enhancing Rural and Urban Digital Innovation Territories” Digital service developed vaccination consent e-service and automation of e-service for consent.</p> <p>Örnsköldsvik and Kramfors municipalities as stakeholders of ALAV in ERUDITE project developed vaccination consent e-service and extended the e-service with Robotic process automation (RPA). The e-service for consent extended with the RPA solution can be used for all information and data collections than vaccination consents.</p> <p>All children in Sweden are offered protection against serious diseases through a national vaccination program. Before the vaccination, the guardians need to respond to the vaccination offer. To provide this service the municipality of Örnsköldsvik and Kramfors were devoted to work with consent of vaccination. To enable automation, the two municipalities started the development work by developing an e-service. According to Kramfors the consent of vaccination had previously been obtained on a paper form that the responsible school nurse distributed through the students or via letters to the relevant custodians for registration. There is a great benefit in automating the management of vaccination concessions e.g., in the time savings, mailing and reminders. The e-service has resulted in an increase in the number of correct cases received in a timely manner.</p> <p>Örnsköldsvik municipality developed a solution for consents, in addition to that the service extended to more information collections than vaccination consents. In short, the solution consists of an ordering application where each nurse can follow their cases from order to journal entry, whether it concerns consents for vaccination or other data collection. The solution is based on the nurse's view, where an overview of the classes one is responsible for is offered. The nurse orders collection for students and what information is to be collected and an RPA solution posts the case in the external case management platform under the responsible guardian in Open-E platform. The guardian receives a notification that</p>



they have a case to answer and can then go into a started case that is pre-filled with information that the municipality already knows and finish it by entering information plus signing. If there are several custodians, the case goes on to the next and when all custodians have signed, the case is submitted, and another RPA process downloads the case and enters the response into the record system. The solution was implemented in spring 2022 and used in production from autumn 2022.

Skills (training skills in Örnsöldsviks municipality)

Upskilling co-workers in process leading and co-creation innovative methods. The municipality has process leaders network that can lead co-creation meetings with innovative methods. The Municipal organisation has experience in working cross functions/business areas which creates good conditions for innovation. The work has been done to investigate and explore how the organization can support employees' ideas. This can be used as a starting point for creating structures that support exploration and innovative work. The innovation & digitalization is priorities of the municipality and is anchored in the leadership. They have a development department that consists of competencies such as e-service developers, IT strategists, business developers, website developers, digitization strategists, information security specialist.

Service design

Service design is about gaining important insights into the real needs of its users (patients, users, residents). The method is based on working in a creative, exploratory and engaging process and, together with the users, develop ideas and test whether they work. It is not about starting to do new things, but about doing things on "right" way, and maybe even stopping doing what is not in demand. Since the work is done in an iterative and co-creative process, good conditions are also created for the ideas to become reality and spreads.

Main fields of application and impact generated

Automation and digitizing of e-service for consent.

Digitizing and automating the vaccination consent have created increased digital awareness within the student health organization and easing the administrative burden for the school nurses and to increase the service to the municipality's residents. Further the results shows that the increase in user digital maturity and their expectations to perform many administrative tasks by using digital services, are now well established, driving the implementation of new ways of working, both from a sender and a receiver perspective.

- Reduced financial costs for handling papers (printing, postage, collection, scanning)
- Time savings in administration of paper-based consents.
- Simplification of consent process for legal guardians, reducing time spent and increasing reach. Time savings for teachers (and pupils) in administrating paper-based consents.



- Reduced workload and stress for school nurses.
- Increased awareness, knowledge and maturity about digital services and process re-design, giving synergies in digitalizing other workflows and processes.
- Increased reach, patient security and health prevention for vaccinated pupils
- Reduced school nurse turnover giving lower staff turnover costs, e.g., related to recruitment and introductory training of nurses.

Upskilling co-workers in process leading and co-creation

- The municipal activities have a better ability to drive change work.
- Contribute to business development
- Strengthen development, ability to change, innovation and trust.
- Increase the ability to carry out co-creative meetings and processes
- Work across organizations/cross-functionally

Service design

Örnsköldsvik municipality wants to train business developers and process leaders in service design to increase the ability to understand and meet the needs of users. Service design complements the methods we already work with in the network, such as open space and whole person process facilitation.

Transferability

There is significant interest in the municipality businesses of trying and adopting the methods and tools the benefit it can provide. The working method and the tool are open, free of charge for the municipality business and the knowledge are easily transferable. Municipal operations can, when a need arises, order the support of process leaders, service design experts or e-service developers.

Other info

Include here additional info, links, videos, etc regarding the experience.

automation of e-service for consent

[ERUDITE2 – i spåren av Covid -19 | Kommunförbundet Västernorrland \(kfvn.se\)](#)

Film describing service design

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

Process management methods

[Open Space Consulting - Open Space Consulting frigör livskraft i människa, organisation & samhälle](#)



Open Data Training

<p>General information</p> <ul style="list-style-type: none"> - Producing region: Galway, Ireland - Producing organisation: Insight Centre for Data Analytics, University of Galway - Contact person: Lukasz Porwol
<p>Category</p> <ul style="list-style-type: none"> <input type="checkbox"/> Digital technologies <input type="checkbox"/> Delivery models <input type="checkbox"/> Procurement of innovative solutions <input checked="" type="checkbox"/> Skills
<p>Brief description</p> <p>The Insight Centre for Data Analytics at the University of Galway runs various training courses, workshops and hackathons. UoG's researchers, in addition to an extensive inventory of skills and materials related to Data Analytics, have Open Data Institute certification to deliver ODI courses. Currently, UoG, together with UrbanTide and funded by DPER, provides a set of training courses to members of different departments of the Irish government in the area of Open and Linked Data, Data Analytics and Data Visualisation. UoG has been hosting public Open Data Hackathons in partnership with Irish Statistics Office – Apps4Gaps and Alice Perry Hackathon.</p>
<p>Main fields of application and impact generated</p> <p>Apps4Gaps and Alice Perry Open Data Hackathons The hackathons supported and boosted the public in building the capacity for consuming Open Data produced by national and local bodies.</p> <p>Open Data Training with DPER The Open Data Training has been delivered to many departments of the Irish government. The main goal for the program has been to elevate the skills and capacity building in the areas of Open Data, Open Linked Data as well as Data Analytics and Data Visualisation.</p>
<p>Transferability</p> <p>The know-how and content which is largely Open Source can be leveraged to deliver new sessions and new services.</p>



Other info

Potential GIS software for decision-making on digital and green transition

General information

- **Producing region: South Savo**
- **Producing organisation: University of Helsinki, Ruralia Institute**
- **Contact person: Toni Rynnänen and Anni Tuomaala**

Category

- Digital technologies**
- Delivery models**
- Procurement of innovative solutions**
- Skills**

Brief description

The European Union aims to be climate-neutral by using digital technologies by 2050. This is called as green and digital transition or twin transition. On a country level, Finland is committed to be the world's first fossil-free welfare society by 2035. To achieve these ambitious goals, it is necessary to understand the regional prerequisites and capabilities of the green and digital transition.

Green and digital transition strategies are valued by many organizations, yet it is at times hard to recognize where twin transition capacities are located. Geographical Information Systems (GIS) software enable showing spatially distributed information on a map. One of the objectives of INNOCAP project is to produce interactive maps of spatial data describing various characteristics of the twin transition (digital & green) in the NPA and rural areas.

This report identifies potential GIS software for the above-mentioned task and explores the strengths and weaknesses of a sample of 24 GIS software divided into three groups. This report presents available GIS software and divide them into commercial and open-source software. In addition, licenses and estimated maintenance costs are reported.

Purpose of the GIS technology mapping was also to evaluate the prospects of creating web maps, which are realised via the internet and a web browser interface. Compared to traditional maps, web maps allow interactive operations



and online maps can display information extracted from databases almost real time.

Main fields of application and impact generated

Decision-makers need better understanding of twin transition capacities. Decision-makers and developers in municipalities, regional councils and public sector actors would benefit from this new service that locates twin transition capabilities on their target area. Aim is to develop a map that shows digital and green transition potential of a region.

University of Helsinki is main service provider and developer. Delivered service should have visually impressive user-interface. Other prospects to consider are cost of the software and accessibility. The application must be easy to use without considerable education or prior experience and it should be cost effective in terms of purchase price and maintenance costs.

Data from the new service can be used for decision-making due to its ability to display the information on a regional level. By showing the assets and capabilities of the digital and green transition on a map in real time allows better understanding, facilitation, and capacity building of regions. Making the twin transition visible is an opportunity for municipalities and other service providers to promote the capabilities of their region.

Additionally, developed service allows stakeholder engagement in service development and project piloting. Developed service will be piloted with municipalities' representatives later during the project. The aim is also to collect feedback, target the service and explore other potential users or user groups. All the above mentioned is related to the underlying goal of achieving carbon neutrality. By illustrating twin transition capabilities, it is easier for municipalities and regions to promote carbon neutrality goals.

Description of the identified GIS software

The identified GIS software are divided in 3 groups based on their field of application:

- 1) High-performance GIS software
- 2) General-purpose GIS software that provides data input, manipulation, management, analysis, and visualization tools, and
- 3) GIS software with limited applications.

After presenting the GIS software, key information is presented in the table 1. The information includes the name of the GIS software (in alphabetical order), source code (open source/commercial), license information, maintenance costs, plugins, and observed advantages and disadvantages in intended use.

1. High-performance GIS software

GIS software are designed for different uses. The performance of a software also differs from one another. High-performance GIS software can be used to produce demanding modelling and analyses.

1.1 ArcGIS Pro



ArcGIS Pro is one of the most popular commercial GIS software. It is high-performance and provides practically all spatial analytics tool, cartographic features, data processing and analyses, support services and web map creation.

ArcGIS Pro is good option when heavy processing of data or spatial analysis is needed. Due to high cost of the license, it is not as attainable compared to open-source GIS software. The software tends to crash time to time in heavy use.

ArcGIS Pro website: <https://www.esri.com/en-us/arcgis/products/arcgis-pro/overview>

1.2 Global Mapper

Global Mapper is not as expensive compared to other commercial GIS software. Software supports many data formats and allows direct access to spatial databases. Editing and analysis tools are available, and software is easy to use and strong in data processing.

Disadvantages are that Global Mapper does not support web maps itself, Mango Map interface is needed for web map creation. In addition, software is not the best for cartography due to limited symbolization and print layouts.

Global Mapper website: <https://www.blumarblegeo.com/global-mapper/>

1.3 Hexagon Geomedia

Hexagon Geomedia is also a high-performance GIS software, and it provides spatial analysis, cartography, web-based mapping, and remote sensing capabilities. It is also allows combining data from different sources.

In the same way as other commercial high-performance GIS- software, Geomedia's license is pricy. User interface divides opinions.

Hexagon GeoMedia website: <https://hexagon.com/products/geomedia>

1.4 Manifold system

Manifold system is high-performance GIS software, which benefit is fast data processing. Software has appealing user interface. Software combines mapping, CAD, DBMS, and image processing. Manifold system provides hundreds of tools.

Manifold system is not the best option for cartography. Downside is also limited web map editing and publishing. The user community is not as active or extensive compared to other software.

Manifold system website: <https://manifold.net/>



1.5 MapInfo

MapInfo provides data editing, visualizing and analysis tools. It is easy to use with appealing user-interface, fast in processing, and a high-performance GIS-software.

Software is costly, and it does not support web maps nor all data formats.

MapInfo website: <https://www.precisely.com/product/precisely-mapinfo/mapinfo-pro>

1.6 QGIS

QGIS is the leading open-source GIS software. QGIS is user-friendly, it supports numerous vector, raster and database formats and functionalities. Software provides broad range of plugins. The software can be used to visualize, manage, edit, analyse data, and create maps. QGIS is compatible with GRASS and SAGA tools, and it provides geocoding as well.

There are some downsides of QGIS software. Labelling can be complicated and QGIS has also less base map options. Plugins are useful resource but unfortunately, they are needed for many functions. Documentation of how to use the software or plugins is poor.

QGIS website: <https://www.qgis.org/en/site/>

1.7 System for Automated Geoscientific Analyses (SAGA GIS)

SAGA GIS enables high-performance functions such as terrain analysis, 3D modelling, spatial and statistical data analysis. Software is relatively easy to use, and user interface is practical. SAGA GIS provides data management and visualization tools.

Downsides of the software are small development community and inadequate documentation on how to use tools and help panel. SAGA GIS is not either the best alternative for cartography. Also, data editing and manipulation options are limited. Software does not support web map publishing.

SAGA GIS website: <https://saga-gis.sourceforge.io/en/index.html>

1.8 The Geographic Resources Analysis Support System (GRASS GIS)

GRASS GIS is a high-performance software providing over 400 data manipulation tools (raster, vector, imagery, 3D raster). It has an extensive selection of advanced data analysis tools. Software is advanced in processing and geospatial programming. Data is compatible with many formats.

Disadvantages of the software include complex usage and impractical user interface. It is not the best alternative for cartography and mapping.



GRASS GIS website: <https://grass.osgeo.org/>

2. General-purpose GIS software

General-purpose GIS software provide basic geographic information system functions such as creating, managing, analysing, viewing, editing and mapping spatial data.

2.1. Carto

Carto is a cloud and web-based software providing data storing, management, analysing, editing and visualizing. Carto also allows web mapping and includes various spatial analysing tools.

Disadvantages of Carto are high costs and rather complicated user interface.

Carto website: <https://carto.com/>

2.2 GIS Cloud

GIS Cloud is another web and cloud-based GIS software. Software provides direct access to web data, which can be presented in real time onto system. GIS Cloud supports web map creation. Spatial analysis is also available.

Software does not support all data formats. It is also expensive.

GIS Cloud website: <https://www.giscloud.com/>

2.3 GeoServer

GeoServer is web-based and uses open standards. Application of the software is sharing, editing and managing geospatial data. The software is compatible with many data formats.

There are no support services available. GeoServer does provide only a limited selection of analysis or data processing tools.

GeoServer website: <https://geoserver.org/>

2.4 gvSIG

gvSIG is popular and rapidly developing GIS software. Advantages of the software are accessibility and practical user interface. gvSIG is compatible with common formats, vector and raster files, databases, and remote services. It also provides simple data analysis tools.

Downside of the software is challenges with coordinate systems.



gvSIG website: <http://www.gvsig.com/en>

2.5 Mango Map

Mango map is easy to use and has practical user interface. The software provides desktop analysis tools, and it is compatible with many data formats. Mango Map is simple software with very basic functions.

Limited editing and data presenting features are challenges. Also, software does not support routing, story maps, or 3D applications. Another downside is high costs.

Mango Map website: <https://mangomap.com/>

2.6 MapBox

MapBox is fast GIS software. The software provides creating, searching, and navigating geospatial data. API and geocoding are also included.

The weakness of MapBox is cartography due to lacking elements such as scale, north sign, title, legends, and coordinate information. The software does not either provide spatial analysis tools.

MapBox website: <https://www.mapbox.com/>

2.7 MapServer

MapServer is compatible with many data formats. It also provides creation of web maps. Another advantage is that MapServer is compatible with other open source or commercial software packages.

Due to limited tools, MapServer has limited performance. Software tends to lag and it can be slow.

MapServer website: <https://mapserver.org/>

2.8 Maptitude

Maptitude is compatible with many data formats. Software is easy to use and has practical user interface. Maptitude provides sufficient data visualization and analysis tools.

Web mapping has quite primitive functionality. Software lacks some geoprocessing and another analysis tools. It is also expensive.

Maptitude website: <https://www.caliper.com/maptitude/mapping-software.htm>

2.9 Maptive



Maptive provides basic GIS applications such as data visualization and analytics, 3D imaging, geocoding, labelling and map creation. Web map creation and sharing are also available.

Disadvantage of Maptive is high costs. In addition, software does not provide geolocation nor statistics tools.

Maptive website: <https://www.maptive.com/>

2.10 OpenJUMP

OpenJUMP provides basic map creation applications. Vector and raster geospatial analyses are available. Software is compatible with many data formats.

Disadvantage is cartography due to limited support for symbology and labelling. Software has also limited range of tools.

OpenJUMP website: <http://www.openjump.org/>

2.11 PostGIS

PostGIS is database extension of PostgreSQL. Software is strong in handling and processing spatial data. Software is easy to use. PostGIS is compatible with almost every data format. PostGIS can be used for improving capabilities of spatial data.

Downside of the software is weak visual interactivity on large geospatial datasets. PostGIS is not either capable to present real time data aggregations and queries.

PostGIS website: <https://postgis.net/>

2.12 uDIG

uDIG has a practical user interface. Software provides map visualization, data manipulation, editing and map printing. uDIG provides an access to remote databases and servers. It is also possible to create web maps with uDIG.

Downside is a small user community. uDIG has also limited cartography features.

uDIG website: <http://udig.refractions.net/>

2.13 ZeeMaps

ZeeMaps is commercial GIS software. Software provides routing, 3D Imaging, geocoding, map creation and sharing and basic spatial analysis. ZeeMaps supports interactive web map publishing.

Downside is unpractical interface. Software is also expensive, even though viewing is free. Labelling function is only mediocre.



ZeeMaps website: <https://www.zeemaps.com/>

3. GIS software with limited applications

Another group of GIS software are designed for a specific purpose such as conducting statistical analyses. The general functionality of a software may be limited as other typical features of multi-purpose GIS software may be missing or very limited.

3.1 AutoCAD Map 3D

AutoCAD Map 3D can be considered as GIS software with limited applications due to its operation mode. AutoCAD Map 3D is a toolset combining both CAD and GIS capabilities. Toolset can be used for map creation, geographic data visualisation purposes.

AutoCAD Map 3D has limited range of analysis tools. The software is not the best for cartography due to limited symbology and map types. AutoCAD Map 3D target group is engineers. Therefore, the toolset can be hard to use and efficient software usage needs expert skills.

AutoCAD Map 3D website:

<https://www.autodesk.co.uk/products/autocad/included-toolsets/autocad-map-3d>

3.2 GeoDa

GeoDa can be considered as GIS software with limited applications due to its statistical analysis focus. GeoDa is compatible with common data formats and has many applications for statistical analysis. The software includes GeoDa-Web applications.

Downside is lack of common GIS tools and limited editing possibilities. Software provides limited capabilities for mapping.

GeoDa website: <https://geodacenter.github.io/>

3.3 Whitebox Geospatial Analysis Toolbox GAT

Whitebox GAT (Geospatial Analysis Toolbox) is GIS software package that provides advanced geospatial analysis, geoprocessing, and hundreds of plugins. The software is integrated with popular sources and allows interactive visualization.

Software is limited option for mapping, editing, and data management, due to limited symbolization and labelling. Whitebox GAT does not provide web map services or online publishing.

Whitebox Geospatial Analysis Toolbox GAT website:

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



4. Summary of GIS software and their key features

The following table summarize the features of the mapped GIS software.

Table 1. Identified GIS software (in alphabetical order), source (open or commercial), estimated maintenance costs, plug-ins available, and summary of the main advantages and disadvantages. Colours show fit for INNOCAP (green = suitable; yellow = with reservations; red = key features missing)

Name	Source	Chargeable license	Estimated maintenance costs	Expandable with plug-ins	Strengths	Weaknesses
ArcGIS Pro (1)	Commercial	Yes	\$100–3800	Yes	High-performance for data processing and analyses, support services, broad range of tools, web map creation	High cost, crashes time to time, some GIS software are faster in processing data
AutoCAD Map 3D (3)	Commercial	Yes	2342–7025 €	Yes	Both CAD and GIS capabilities, map creation and geographic data visualisation.	Limited range of analysis tools, not the best for cartography due to limited symbology and map types, hard to use
Carlo (2)	Open	Yes	\$199/month	No	Cloud based, allows to connect spatial data from different sources, access various geospatial datasets, geocoding, routing, isolines and base maps, web map creation	Expensive, mainly for expert users
GeoDa (3)	Open	No	Free	No	Compatible with common data formats, many applications for statistical analyses, suitable for viewing maps, GeoDa-Web	Lacks many GIS tools due to its focus on statistical analyses
GIS Cloud (2)	Commercial	Yes	\$1788–16 890 / year	No	Direct access to web data, provides spatial analysis and systems distribution, data can be presented in real time onto system, web maps	Does not support all data formats, expensive
GeoServer (2)	Open	No	Free	Yes	Compatible with many data formats, web-based, for sharing geospatial data	No support services, not many analysis or data processing tools



Name	Source	Chargeable license	Estimated maintenance costs	Expandable with plug-ins	Strengths	Weaknesses
Global Mapper (1)	Commercial	Yes	\$50-1449	Yes	Supports many data formats, direct access to spatial databases, editing and analysis tools, web map publishing via Mango Map	Symbolization and print layouts are not the best, functionality on web maps and apps are not either the greatest
The Geographic Resources Analysis Support System (GRASS GIS) (1)	Open	No	Free	Yes	Need of low memory profile, raster, vector and geospatial processing, layer management and image classification, data modelling, visualization, management, and analysis	Unsuitable for cartography and mapping, hard to use
gvSIG (2)	Open	No	Free	Yes	Compatible with common formats, vector and raster files, databases and remote services, simple data analysis	Not as good for cartography, coordinate system issues
Hexagon Geomedia (1)	Commercial	Yes	1 200 €	Yes	Access to geospatial data in many forms, good for cartography, many analytical tools, and clear symbolization	License level has an effect to available tools and the costs are different depending on the level
Mango Map (2)	Commercial	Yes	\$470-3 830/ year	Yes	Easy to use and learn, desktop analysis tools, compatible with many data formats, basic functions	Does not have many editing and data presenting features either routing, story maps, or 3D applications, expensive
Manifold system (1)	Commercial	Yes	\$95-275	Yes	Fast, broad range of tools, high-performance, compatible with different kinds of data	Not as good for cartography, map design and web mapping

Name	Source	Chargeable license	Estimated maintenance costs	Expandable with plug-ins	Strengths	Weaknesses
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MapBox (2)	Open	Yes	From free to \$6000	Yes	Fast, allows creating, searching, and navigating, API, geocoding	Lacks the essential cartographic elements such as scale, north sign, title, legends, and coordinate information, no spatial analysis tools
MapInfo (1)	Commercial	Yes	920-1490 €	Yes	Data editing, visualizing, and analysing tools, easy to use, fast, high-performance	High cost, do not support web maps nor all data formats
Mapserver (2)	Open	No	Free	No	Compatible with many data formats, web maps, compatible with other open source or commercial software packages	Limited performance, can be slow in use
Maptitude (2)	Open	Yes	\$420-9995	Yes	Compatible with many data formats, high-performance, easy to use, full-featured tools, data visualization and analysis tools	Web application has quite primitive functionality, lacks some geoprocessing tools, expensive
Maptive (2)	Commercial	Yes	\$1250-2500/year	No	Web map creation and sharing, data visualization and analytics, 3D imaging, geocoding, labelling, map creation	High cost, weak geolocation and statistics tools
OpenJUMP (2)	Open	No	Free	Yes	Provides vector and raster analyses, compatible with many formats, basic map creation applications	Weak in cartography due to limited support for symbology and labelling

Name	Source	Chargeable license	Estimated maintenance costs	Expandable with plug-ins	Strengths	Weaknesses
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PostGIS (2)	Open	No	Free	Software is a plug-in of PostgreSQL	Strong in handling and processing spatial data, easy to use, compatible with many data formats, can be used for improving capabilities of spatial data	Weak visuals on large geospatial datasets, not capable to real time data aggregations and queries
QGIS (1)	Open	No	Free	Yes	Data viewing, editing, and analysis, vector and raster data in various formats, different kinds of plugins are available to create web Maps, GRASS and SAGA tools are integrated, geocoding	Labelling is complicated, fewer base map options, 3D applications are not the best, plugins are needed for many functions, lacks some documentation on how to use tools
System for Automated Geoscientific Analyses (SAGA GIS) (1)	Open	No	Free	No	Provides processing, mapping and raster calculation of data, quality spatial and geostatistical tools, fast processing	Small user community, lacks documentation on how to use tools and help panel, limited in cartography, does not support web map publishing
User-friendly desktop Internet GIS (uDIG) (2)	Open	No	Free	Yes	Map visualization, data manipulation, editing, map printing, access to remote databases and servers, web map	Small user community, limited cartography features
Whitebox Geospatial Analysis Toolbox GAT (3)	Open	No	Add-ons \$10-350	Yes	Advanced geospatial analysis, Integration with popular sources, interactive visualization, geoprocessing	Limited symbolization and labelling, no web map services or online publishing
ZeeMaps (2)	Commercial	Depends on subscription viewing is free	\$0-999,95	No	Routing, 3D Imaging, geocoding, map creation and sharing and spatial analysis	Poor user interface, high cost, labelling is limited

Summary and suggestions for choosing the GIS software

This report presented 24 most used geographic information system software and their central features. The aim is to choose the most applicable software for further development and use it for showing regional twin transition data on a map.

The identified software were divided in three groups based on their field of application:

1) High-performance GIS software



- 2) General-purpose GIS software that provides data input, manipulation, management, analysis and visualization, and
- 3) GIS software with limited applications.

The most needed feature is map creation and visualisation, which would be able to presents data preferably on real time. Only a limited number of GIS software offers this web map option. Possibility to create interactive map would be also an appreciated feature.

Cost of licenses, source code and accessibility are all features, which needed to be assessed when deciding software for the new service creation. The type of source code (commercial or open source) has significant impact on functionalities of the software.

Another aspect is an active user community, support functions and available guidelines. Commercial software tend to have stronger support services but costs are significantly higher. Other significant limitation is related to selection of cartography options and tools (mostly labelling and symbolization).

In addition, the need of processing power should be considered when deciding software for the service delivery. The high-performance GIS software are better alternatives when strong computation capacity is needed. The essential question is whether the chosen software can perform necessary functions.

Based on the above-mentioned criteria, 4 GIS software was graded as potential (colour green in the table 1). These software are GeoServer, MapServer, QGIS and uDIG.

The assessment shown in table 1 suggest that **QGIS** is the most suitable for further development and best option for piloting.

Other information

Links to additional software information and examples of interactive web maps:

ArcGis Pro: <https://www.esri.com/en-us/arcgis/products/arcgis-pro/overview>

AutoCAD Map 3D: <https://www.autodesk.co.uk/products/autocad/included-toolsets/autocad-map-3d>

Carto: <https://carto.com/>

- Webmap (AenaMaps: an indoor navigation solution) of Aeropuerto Adolfo Suárez Madrid-Barajas <https://www.aena.es/es/map.html>.

GeoDa: <https://geodacenter.github.io/>

GIS Cloud: <https://www.giscloud.com/>

GeoServer: <https://geoserver.org/>

Global Mapper: <https://www.bluemarblegeo.com/global-mapper/>

GRASS GIS: <https://grass.osgeo.org/>

gvSIG: <http://www.gvsig.com/>

Hexagon GeoMedia: <https://hexagon.com/products/geomedia>

Mango Map: <https://mangomap.com/>

Manifold system: <https://manifold.net/>



MapBox: <https://www.mapbox.com/>

- Interactive web map of Lonely Planet travel destinations
<https://www.lonelyplanet.com/europe>
- Interactive web map of World's travel destinations
<https://mapcarta.com/>
- UNESCO World Heritage Destinations Interactive Map
<https://visitworldheritage.com/en/eu>

MapInfo: <https://www.precisely.com/product/precisely-mapinfo/mapinfo-pro>

MapServer: <https://mapserver.org/>

Maptitude: <https://www.caliper.com/maptitude/mapping-software.htm>

Maptive: <https://www.maptive.com/>

OpenJUMP: <http://www.openjump.org/>

PostGIS: <https://postgis.net/>

QGIS: <https://www.qgis.org/en/site/>

SAGA GIS: <https://saga-gis.sourceforge.io/en/index.html>

uDIG: <http://udig.refrations.net/>

Whitebox Geospatial Analysis Toolbox GAT: <https://www.whiteboxgeo.com/>

ZeeMaps: <https://www.zeemaps.com/>