Join the SMART SPECIALISATION PLATFORM

Regional Pilots

Lessons Learned from the Smart-Up BSR Thematic Pilots – A Guidebook

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This output has been developed based on the pilot reports provided by the Smart Up BSR project partners. This consolidated report as a guidebook for regional pilots is a result of reiterative processes between partners during the activities related to regional pilots. Regional lessons learned are based on pilot implementation processes that constituted the innovation ecosystem experiences of Smart Up BSR partners. The contributing partners are listed below.

1. Introduction

This report consolidates regional lessons learned in the specific Smart-Up BSR regions based on pilot implementation processes that constituted the innovation ecosystem experiences of Smart Up BSR partners. The presented results function as a guidebook for other regions both in the Baltic Sea macro-region and elsewhere in Europe.

With a view of how transformational processes can actively be promoted cross-regionally and at macro-region level, this guidebook includes a selected group of activities around the concept of thematic piloting (active healthy aging, smart city, climate change, circular economy) as a method to increase innovativeness at inter-regional level.

Thematic piloting in the four chosen themes derives from the goals of the European priorities. More importantly, as the pilot overview and analysis for the Smart-Up BSR regional pilots show, thematic piloting can be considered a major playfield for sustainable and entrepreneurial economic transformation that requires capacity building in the Baltic Sea Region.

The contributions of the Baltic Sea regions within the Smart-Up BSR project lead us to insights on what lessons can be learned and what tools are needed for regional implementation.

2. Thematic pilots

The European approach to a digital future is based on three main pillars which have the role to ensure opportunities for citizens and businesses and governments in a multi-level digital transformation. The three pillars are of crucial importance for local and regional implementation as they ensure that the EU's digital strategy will foster technology innovation that works for the people, that businesses operate in a fair and competitive digital economy, and that a democratic and sustainable society includes citizens with better control and protection of their data, with the opportunity to develop a health data space to foster targeted research, diagnosis and treatment, and the ability to fight disinformation online and foster diverse and reliable media content.

By creating better conditions for the BSR regions to cooperate in the innovation and entrepreneurship activities, the target is not only to support individual regions but also to enhance measures for the BSR to reach the level of smart and innovative macro-region.

Examples from the chosen spearhead topics include Activity Healthy, Smart City, Climate Change, and Circular Economy. Based on the innovation camp processes some of the partnering regions have focused their special interest on one or several of these themes to further develop Smart Specialisation policy implementations.

Active Healthy Aging

The increasing number of older adults is becoming a challenge for many Baltic Sea Region countries, in a similar way as the number is increasing overall in other European countries. There is no doubt that the age profile of society in Baltic Sea Region is rapidly evolving and the proportion of people of working age is shrinking, while the number of older people is expanding.

Active and Healthy Ageing (AHA) is about "optimizing opportunities for good health, so that older people can take an active part in society and enjoy an independent and high quality of life" (Swedish Institute for Public Health). This approach emphasizes how older people can contribute in valuable ways to the successful functioning of the society. However, this requires platforms and networks which not only support a healthy and active lifestyle but also build up crucial knowledge and in addition form new skills and experiences.

This requires a system-wide support to introduce necessary health promotion interventions on societal level, and construct opportunities for more active involvement of older people to solving societal challenges & tasks, which can pave the way for new policies and new interactive services.

AHA can only be achieved by engaging the various stakeholders in finding solutions to their needs and in engaging them to adjust their attitudes on what creates a functional framework of policies, practices, industries and communities that promote healthy and active ageing. Stakeholders are for instance ICT professionals, caregivers, healthcare professionals, elderly and their family members. AHA solutions can be created by consistent interaction leveraging regional and national networks. Cross-regional collaboration can lead to sustainable solutions in AHA networks that benefit all Baltic Sea Region AHA stakeholders.

As emphasised in the EUSBSR promotion of health policies[1] there is also a connection between the environment and health and well-being of residents in the Baltic Sea Region. Addressing such overarching challenges can therefore not be limited to the local or national level of action and cross-regional cooperation becomes essential to tackle this problem and to ensure prosperity to the region.

Climate Change and Plastic-free Baltic Sea Region

The Baltic Sea regions are putting sustainability at the top of their agenda. There are several regions in the BSR which operate according to a green mindset and which host a world-class research environment. Finland, Sweden, Denmark, Germany, Estonia, Latvia are already generating sustainable solutions for various industries and administrative areas. Poland, Lithuania and Russia are steadily working towards creating opportunities for innovations with sustainability as a development focus. BSR cities are preparing and implementing action plans to adapt and mitigate climate change based on the Global Covenant of Mayors for Climate and Energy. Linking and upgrading infrastructures, technologies and services in key urban sectors (transport, buildings, energy, ICT) in a smart way will improve the quality of life, competitiveness and sustainability of our cities.

Today 78% of European citizens live in cities and 85% of the EU's GDP is generated in cities. Already today cities generate 80% carbon dioxide emissions. Many European cities are forerunners in the much-needed transition towards a low carbon, resource-efficient and competitive economy.

Sustainability is so much more than a buzzword in most BSR regions. Finland, for example, aims to transform the country into a "socially, economically and ecologically sustainable society by 2030". It has been a long-term commitment to sustainable development, and it is starting to bear fruit. According to a recently published UN voluntary agenda review from the Finnish Prime Minister's Office, the country is close to achieving many of the United Nations' 17 Sustainable Development Goals (SDGs) and is increasing its efforts with its goal of becoming carbon neutral by 2035.

On a global scale, Finland is one of the leaders in the transition from fossil fuels to more sustainable energy sources. Finland was ranked third in the 2020 Energy Transition Index by

[1] https://www.balticsea-region-strategy.eu/news-room/highlights-blog/item/96-health-in-all-policies-how-does-eusbsr-promote-health?utm_source=newsletter_85&utm_medium=email&utm_campaign=eusbsr-newsletter-march-2019

the World Economic Forum, which compared the energy sectors of 115 countries in terms of their readiness to adopt clean energy to meet climate targets.

Finnish regions work intensively together with businesses in order to enhance the opportunities for industry to do its part in tackling the climate crisis by adopting sustainable resource management practices driven by climate awareness, or simply green thinking. 2020 marks six large Finnish corporations among the Corporate Knights' Global 100 list of the world's most sustainable companies: Neste (among the top three), Outotec, UPM-Kymmene, KONE, Metso, and Kesko.

While renewable diesel produced by Neste produces up to 90 per cent less greenhouse gas emissions than fossil diesel, inspiring planet-friendly solutions are emerging. Along established businesses also Finnish cities put sustainability into practice. The City of Lahti, 90 km north of Helsinki, for example received the European Green Capital Award 2021, and is among the many Finnish cities at the forefront of urban sustainability. What positions Lahti among the five most forward-thinking European cities, is the city's app-based trading scheme for personal traffic emissions, as well as its innovative solutions for waste management and water conservation efforts.

Finnish universities are also key actors in contributing with solutions to global challenges and contribute to social, environmental and economic wellbeing. The Impact Ranking by Times Higher Education has taken note of actions taken by Aalto University, the University of Helsinki, the University of Turku, Lappeenranta-Lahti University of Technology LUT, the University of Eastern Finland, all situated around the Baltic Sea Region and committed to realise the UN's SDGs. The contributions of scientific research to sustainability solutions plays a crucial role in the regional ecosystem producing for commercially viable solutions provided by industry. Also, the involvement of the VTT Research Institute needs to be noted in the field of sustainability and climate change, as synergies are created regionally as well as cross-regionally. For example, a sustainable idea first developed with the commercial and residential construction sector in mind later proved efficient and commercially viable in greenhouse farming, while still holding high potential for the future transition to green building. Also, innovative material is developed by VTT which can be used similarly to plastic but is 100 per-cent environmentally friendly and recyclable. This research is focussing on finding solutions to the global plastic waste crisis. Hence, the development of viable sustainable alternatives to traditional plastics, especially those used in packaging, is one of the priorities, in collaboration with local, regional, and inter-regional industry, such as Arla Foods, Paulig and Wipak.

The best practices in the Baltic Sea Region can be the basis for other regions to develop actions for upgrading their Smart Specialisation. Implementation of innovations is enhanced when regions and actors in the Baltic Sea develop partnerships among each other as well as at EU levels. The actions developed in collaboration can lead to local and inter-regional action plans that serve as a relevant resource for diverse BSR partners to develop their own plans more efficiently when adapting the focus to their regional needs.

This can be done by addressing different areas of the urban settings, e.g. the building stock, energy systems, mobility, climate change, water or air quality as activities in these areas are expected to have profound economic, social and environmental impacts, resulting in a better quality of life, competitiveness, jobs and growth.

Circular Economy

Circular economy has been identified as one of the important pathways to both reducing the effects of climate change yet maintaining economic activities and increasing economic, social and environmental capitals. The major approach offered by circular economy is being restorative and regenerative, rethinking waste and finding synergies between economic actors and regions. This requires system-wide innovation, since such approach can't be embraced by actors in isolation.

The European Commission has established an ambitious agenda to transform EU economy into a circular one. Circular economy offers significant advantages, including economic, environmental and social benefits, such as larger profits, reduced carbon emissions, cleaner production methods, and the creation of new jobs. Transition to a circular economy requires an entirely new way of thinking, as well as a new approach to process and product design.

Circular economy covers all aspects of human behaviour and operations. The need for circular solutions in all aspects of society has risen in awareness even more than is currently the case. It affects consumption, production, industry, urban planning to mention a few areas, and it is urgent as today, only a few percentages of the original product value is recovered after use. The most concrete part is the cycle from production and consumption, to waste management and the market for secondary raw mate-rials. Circular economy maximizes the use of materials and retains their value for as long as possible. A circular economy is based on the use of services and intelligent digital solutions, and the design and pro-duction of more durable, repairable, reusable and recyclable products. Waste is regarded as a valuable resource. Products are shared, leased or rented, rather than owned by an end user.

Circular economy has the potential to solve the world's mounting waste problem. However, transition isn't easy. Challenges remain, including making the internal business case for it, updating antiquated public policies to promote circular strategies and educating consumers about the merits.

A transformation from a linear to a circular economy does not only enhance resource efficiency, but also promote other social benefits at large – it offsets losses in the labour market e.g. due to automation and secures gains in employment through new jobs.

The Baltic Sea Region includes a number of countries which have included measures towards sustainability in their strategies and are considered to be amongst the best positioned to deliver on the 2030 Agenda and to reach the SDGs, including the global Paris Agreement on climate change and the New Urban Agenda. Therefore, pilots in circular economy solution in the BSR can continue to offer good examples and introduce best practices to support a circular transformation.

Some examples of innovative circular practices are incorporated in smart city innovations that transform management of waste and resources and reshape attitudes of consumers and citizens. These examples can be found in the pilots of several of the BSR regions represented in this study. While regions like Helsinki-Uusimaa, with cities expediating the carbon neutral agenda stand out as internationally renowned examples of how the circular transformation already is advancing, regions are at different stages in acquiring circular economy competencies in the BSR and therefore may need to increase concrete pilots on circular economy.

The need for more knowledge and inspiration is still necessary in order for a circular approach to be integrated across sectors, at different levels, and as the core of sustainable development in the BSR.

Pilot activities are targeted to increase awareness of the partners and to get the BSR regions and cities to accelerate the desired change towards circular economy. This means getting the latest knowledge and providing access to best applications, following the Circular Economy Stakeholder Conference, and the European Circular Economy Stakeholder Platform jointly launched by the Commission and the EESC. The Platform is a hub gathering knowledge on circular economy and a place for dialogue among stakeholders.

Circular economy is an excellent example of themes on which European partnerships can accelerate implementation of Smart Specialisation strategies. The need is evident to work in co-operation with many actor groups across society to develop a circular economy. Businesses, administrations, organisations and the media all need to work in collaboration. An example of this change is Finland: by 2030, the added value provided by a circular economy for Finland's national economy could be at least 3 billion euros per year.

Smart City and Smart Port

About two thirds of the population in the Baltic Sea Region lives in urban areas and the number is expected to rise. The high use of resources in cities calls for sustainable development of urban areas. It requires new, efficient, and user-friendly technologies and services, in particular in the areas of energy, transport and ICT.

The European Commission reacted to the international Smart City movement in 2012 by setting up the European Innovation Partnership on Smart Cities and Communities (also known as the Smart Cities Initiative) as a cross-cutting activity.

As the smart city is a cross-cutting issue, it is crucial to develop a good understanding of the relation and linkages of all the different urban dimensions and actors. The main target of this group of activities is to act as a framework for raising awareness, identifying and disseminating best practices helping the regions to tap into the growth opportunities offered by the Smart City concepts.

The best practices that are created, collected and analysed through Smart City projects function as a basis for regions to develop actions towards upgrading Smart Specialisation

implementation and development of opportunities for innovations shared among the partner regions and actors in the Baltic Sea and EU levels. The actions developed can serve as a relevant resource for project partners to develop their own plans adapted to their regional needs. With the help of these activities some partnering regions can develop their roles to become strong, not just in the BSR but also on a European scale.

Baltic Sea Regions conducted cross-regional pilots in Smart City development, including innovative digitalisation to empower life in the city and services development for citizens and businesses, i.e. including traffic, transport, and logistics.

The European Capital of Innovation Award iCapital criteria and challenge provide an easily adoptable Smart City principle. It is interesting to note that in 2017 six out of the ten finalists were BSR region cities.

Therefore, the Smart City pilots can be recognised with the following elements and activities that aim at:

- Experimenting innovative concepts, processes, tools, and governance models
- Functioning as a testbed for innovation
- Engaging citizens in the innovation process
- Ensuring the uptake of the ideas provided of citizens
- Expanding the city's attractiveness to become a role model for other cities
- Empowering the local ecosystem through the implementation of innovative practices

Smart Cities as a term and concept has been a valuable for many years, allowing for a shared frame of understanding and a powerful international agenda for developing and testing technological solutions and new partnerships for urban development. However, the Smart Cities concept is also ambiguous, and it can be argued that it is so broad that it covers everything and therefore nothing, which makes it difficult to operationalize.

The Smart-Up BSR concrete example of cities that are using the Smart City theme to innovatively transform the approach to regional development are showcased in the pilot reports. The pilot activities related to the Smart City vision of the city of Aarhus, Tallinn and St. Petersburg are a good example of how cities and regions are engaged in collaborative activities to reach an inclusive and sustainable transformation.

3. Lessons from the Analysis of the Smart-Up BSR pilots

The practical experiences of the Smart-Up BSR regions are presented in this overview of lessons learned. This report analyses each pilot from the perspective of the importance the pilot has for the region, the extend of involvement and participation the pilot has generated in the region, the type of activities that have been promoted, their results, and further steps.

The template used to gather the contributions is included in Annex I.

DENMARK – Aarhus Smart City

Importance of the pilot for the region

The Danish Business Promotion Board has identified a number of driving forces to strengthen the region – entrepreneurship, green growth and circular economy, innovation, digitization and internationalization – along with a number of key specialization areas/industries that will play a key role in the Central Denmark Region going forward. These include areas such as foods, energy and environmental technologies, digital technologies, business tourism and innovation within health, IT and creative professions. Investing in and developing new smart solutions is crucial for the public sector to meet the citizens' expectation of ever smarter and better public services within the given economic framework

Aarhus is working towards a more nuanced view of smart cities by creating a new frame of understanding, which incorporates two complementary concepts of *Civic Tech* and *GovTech*. The City of Aarhus' pilot project *GovTech Central Denmark* provides a proposal for how the public authorities in the Central Jutland Region can work together to intensify efforts to solve inherent challenges and make best use of emerging technologies with the aim of making the most of public spending

Civic Tech enhances the relationships between the people and public authorities and in other words provides a tool to build bridges between the citizen and the municipalities. It is technology which enables us to include citizens to participate in the decision-making process and to make their voice heard. It also allows for the sharing of data about the city. Examples of *Civic Tech* include co-creation, public hearing platforms, open data, living labs and citizen science.

GovTech is the public institution's use of radically new technology to improve the delivery of public services through increased efficiency. *GovTech* complements the traditional technological infrastructure with emerging technologies, which allows the municipality to utilize other smart city solutions, i.e. digitalization, and welfare technology. Examples of *GovTech* include the Internet of Things, drones, virtual reality, artificial intelligence and machine learning. In a sense, *GovTech* can be thought of as the public institution's operating

system, enabling them to deliver efficient services, while *Civic Tech* is the citizen's operating system, enabling citizens to connect with decision-makers.

GovTech through IoT, artificial intelligence, blockchain, drones, robots, etc. can improve the provision of public services through increased efficiency and lower costs. *GovTech* thus points to the inside of the public sector organizations and helps to optimize the way we do our work. *GovTech* is also about entering into new collaborations and new forms of collaboration with (typically) smaller suppliers (start-ups, SMEs) and with the educational sector than what has been the traditional practice, partly to stimulate the market and partly to gain access to the latest technology know-how. Here, the small start-up and SME "speedboats" are typically way ahead of the traditional "super tanker" organizations.

The purpose of *GovTech* Central Denmark will be to create a strong link between the public authorities in the region and the businesses by:

- Supporting the public authorities in the region to further push forward the area of public digitalization that is about understanding and leveraging radically new technology
- Serving as a working community and platform for upskilling employees in understanding and working with development, procurement, implementation and use of e.g. IoT technology, drones, robots, artificial intelligence and similar technologies through on-site and virtual project participation
- Stimulating the local business community and seize the opportunity for growth in the area
- Creating a position of strength in the Central Denmark region in the Smart City and *GovTech* areas, based on both the municipalities' and the Region's needs
- Developing concrete solutions for use in the municipalities and in Central Denmark Region
- Establishing and coordinate the collection and sharing of knowledge, know-how and best practices in the field across actors in the region
- Establish new forms of collaboration with the education sector and in this way support as well as utilize the innovation capacity of the educational institutions in the region, e.g. by having ongoing collaborations with various fields of study, where the municipal challenges and the Central Denmark Region's challenges are brought to the attention of students who through projects create innovative concepts or solutions based on the latest research and knowledge of technology etc.
- Creating a joint organization that can both absorb and influence the national and European agendas in the field, including forming a strong and competent interface against Danish government agencies such as KL, DIGST, ERST, EU, OASC and others. on e.g. data standardization and fair AI
- Developing and driving a shared strategy in this area.

Involvement and participation

Projects do not exist in a vacuum, but rather build on other complementary projects in a larger context. The main stakeholders in our pilot are municipalities. *GovTech* Central Denmark will provide a platform and organisation where public institutions can pool

resources, knowledge and experience to explore technologies that would be unattainable for the individual municipalities. It also allows us to test scalable solutions, which can more easily be implemented across municipalities and across borders. Furthermore, *GovTech* Central Denmark will give the municipalities a more cohesive and much stronger purchasing power, which allows the municipalities to make more specific demands to suppliers instead of solely relying on "stock solutions". Finally, *GovTech* Central Denmark will position the Region of Central Denmark nationally as well as internationally as a Smart City powerhouse and frontrunner.

The *GovTech* Central Denmark consortium currently consist of 19 municipalities, the Central Denmark Region and the two business organizations Business Region Aarhus and Business Region MidtVest. As we get further in the development of the *GovTech* centre, we will increasingly include a wider range of stakeholders, i.e. SMEs, suppliers, larger tech companies, business organizations, universities and knowledge institutions, etc.

There are overlaps between the pilot projects, especially with Aarhus City Lab being a test facility for innovative smart city solutions. Some of the solutions developed in *GovTech* Central Denmark could easily be tested on a small scale in Aarhus City Lab before scaling the solutions and implementing them at a much larger scale across the region. Aarhus City Lab also has the potential to be scaled further and developed as a regional living lab to complement *GovTech* Central Denmark. Furthermore, and significantly, the pilot projects' innovation ecosystems are complementary meaning that *GovTech* Central Denmark draws on the partnerships that has already been established in Aarhus City Lab and vice versa.

The public authorities in the Central Jutland region have the opportunity to create a significant position of strength in this area and at the same time scale good and sustainable solutions to the benefit of the community, thereby helping to save resources and solve the challenges facing society today.

Some of these solutions will be municipality-specific and are based on the challenges of individual municipalities. Other challenges are transversal and are more pronounced in the regional work, still with a high degree of commonality. This requires more cross-sectoral cooperation, and it is especially on these challenges that the potential of collaborating more formally on the development of common, sustainable and scalable solutions can benefit the entire region and position the region as a European front runner.

The process of establishing *GovTech* Central Denmark began with forming a strong project group, which would spearhead development of the concept, formulate the vision and intended activities and suggest a governance model and budget. The project group consisted of chief digital officers from three municipalities (Aarhus, Favrskov and Horsens), directors from the two Business Regions and Heads of Offices from the Region of Central Denmark. This project description was then presented to the remaining municipalities at the kick-off meeting. Members of the initial project group included:

- Aarhus Municipality
- Horsens Municipality
- Favrskov Municipality

- The Region of Central Denmark
- Business Region Aarhus
- Business Region MidtVest

Given the shift in responsibility regarding stimulating business and growth away from the regional level to the municipality level, it is imperative that City of Aarhus will embrace this responsibility and opportunity to establish the city as a large-scale testbed for innovative urban solutions that can stimulate growth in the area. Central municipal strategies such as the Climate Plan and the Smart Aarhus strategy will play a key role in forming this. It is only a natural next step to establish a strong, cross-cutting collaboration on emerging technologies and the *GovTech* area in the Central Denmark Region.

Ecosystem orchestration

Denmark has a strong tradition of cross-municipal knowledge sharing and collaboration on, amongst other things national IT infrastructure, digitization strategies, common municipal platforms, Open Source, Open Data and different digital and Smart City clusters. Here work is done to ensure common progress, standards, catalogues of inspiration and low-practical templates for the benefit of the community.

The City of Aarhus plays a significant role in several of these existing initiatives and because of the potential rewards of further collaborating on the uptake of emerging technologies, the City of Aarhus has chosen to also spearhead the *GovTech* Central Denmark initiative by framing the potentials, scoping the collaboration and ensuring buy-in from the 19 municipalities in the region as well as the Region itself.

GovTech Central Denmark is a trans-regional initiative with the purpose of enabling municipalities to explore, test and implement emerging technologies. The centre is an initiative by the 19 municipalities in Central Denmark, the Region of Central Denmark and Business Region Aarhus and Business Region MidtVest. In total, the public authorities represent more than 1.3 million citizens and includes some of the most vibrant innovation hubs, exiting tech clusters and forward-thinking public authorities.

GovTech Central Denmark is the product of the realisation that we are facing the same challenges and that we can get further for the same resources by working together. *GovTech* Central Denmark is a platform and an organization where public authorities can come together and form more structured partnerships than what has traditionally been done. The centre will have a permanent staff of 6 employees who will manage the day-to-day operation, examine funding opportunities and consult municipalities in the projects. The individual projects, which are developed in *GovTech* Central Denmark can either be managed in a decentralized manner by the one of the municipalities or directly by one of the permanent staff in the centre. Furthermore, the municipalities have the option to have one of their employees stationed in the *GovTech* centre for an extended period (a minimum of 6 months). This will allow municipalities to improve the qualifications and experience

level of their employees and will allow *GovTech* Central Denmark to draw on the competencies and expertise of all municipalities in the region. *GovTech* Central Denmark unites the local projects, resources and competencies on a regional level and builds a "proxy" to regional and national agendas on behalf of local government.

Pilot activities

GovTech Central Denmark is an attempt to get more done with the same resources, but it is also about establishing a much more vibrant innovation ecosystem. For the public authorities, *GovTech* Central Denmark will be a platform for cooperation, competence development and knowledge sharing. It will allow municipalities to develop and implement solutions, which would be unattainable on their own. For companies and suppliers, it creates a much larger and more cohesive market where suppliers have a single-entry point to contact and sell products to all the public authorities. For the region, *GovTech* Central Denmark is a way of positioning and strengthening the Region of Central Denmark as an innovation cluster nationally and internationally.

Alongside the establishment of *GovTech* Central Denmark, Aarhus is developing several complementary projects, which have significant overlaps. One of these projects is Aarhus City Lab, which is Aarhus Municipality's digital playground for innovative smart city solutions and a platform for having dialogues with citizens about the role of technology in our society. Aarhus City Lab is a place where the municipality can cooperate with local actors who are interested in developing and testing new technologies, i.e. Aarhus University, SMEs, tech companies and suppliers, entrepreneurs, students and citizens. Aarhus City Lab is a living lab, which means that it provides a venue where experiments can be setup in a realistic use-context and that the end-user is an active participant throughout the process.

Aarhus City Lab acts as a single point of entry into the municipality for external partners: facilitation and coordination are key aspects of Aarhus City Lab to ensure that the right people are matched. Furthermore, Aarhus City Lab acts as a forum for dialogue between citizens and the municipality. Aarhus City Lab is placed pier at the very heart of the city and is a very well-visited area during the summer months. Therefore, it offers great opportunities for the municipality to meet and engage with citizens. Aarhus City Lab will regularly host presentations, prototyping, host Open Lab every Friday and have a mobile office during the summer months.

GovTech Central Denmark will be a network and an organization, which has the expertise and resources to - on behalf of the network - explore, develop and test technologies in concrete projects and solutions, which the municipalities easily can implement afterwards. *GovTech* Central Denmark will have four focus areas:

1. **Project development**: maintain a common technology radar; benchmark the market and suppliers; testing technologies and getting hands-on experiences; advice municipalities in choosing and setting up equipment; identify concrete needs, use-cases and business-cases¨

2. **Establish and manage projects**: establish best-practices for public-private partnerships; establish development partnerships in areas where the market is not yet established

3. **Purchase and implementation**: establish best-practices for purchasing and calls for tenders; formulate standards for purchasing IoT-solutions, drones, AI-services, etc.; ensure data ownership and open data; assist in organizational implementation

4. **Dissemination of knowledge and competence development**: be a centre for competence development; develop and distribute IoT-"starter kits"; arrange inspirational workshops and presentations; maintain a catalogue of use-cases and best-practices

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As a much more concrete part of the pilot the Innovation, Technology and Creativity Department of the Municipality of Aarhus (Aarhus ITK) is also developing an IoT-suitcase, which contains a wide variety of sensors that can be utilized in a range of different Smart City applications. The IoT suitcase is a starter kit, which municipal departments could purchase to start experimenting with IoT solutions or to suit specific needs. A solution like the IoT suitcase will also be made available in *GovTech* Central Denmark where municipalities can get guidance in getting started using IoT sensors and get consultation on purchasing an IoT-starter kit.

Results

Aarhus is the second largest city in Denmark and is one of the most advanced cities in innovation, technology and smart city solutions. As the largest city and municipality in the Region of Central Denmark, Aarhus spearheads the development of smart cities in the Region. However, the many of the remaining municipalities in Central Denmark are not as advanced in terms of innovation and technology and the smart city-agenda is difficult for many of the smaller municipalities and cities. It requires resources, knowledge and expertise, which many of the smaller municipalities simply do not have. Even for a large city like Aarhus, it can be difficult to work with new technologies on a scale that really matter. Therefore, the municipalities have decided to band together and find common solutions to common problems.

Aarhus Municipality has taken the lead in the initiative and *GovTech* Central Denmark will physically be placed in Aarhus, more specifically, in Aarhus ITK – a division in Aarhus Municipality working with innovation and technology. Aarhus ITK has extensive experience in developing and managing innovation projects and spearheads Aarhus Municipality's exploration of emerging technologies. Examples of this include using virtual reality to counter social anxiety when taking the bus or going to the dentist; using crowd sensing and citizen science to map and combat air quality issues; utilizing drones to detect oil spills and robots to clean up the oil; setting up thermal cameras to quickly and accurately detect if someone falls into the river in the city centre; and much more. Aarhus ITK participates in several European projects and already leads several cross-municipal initiatives and networks, such as Open Data Denmark, which coordinates public institution's promotion of open data, and OS2, an open source and digitalization network consisting of 69 Danish municipalities.

Evidently, cross-border cooperation is integral to Aarhus ITK and is an important priority. It is based on the idea that we are stronger together; that progress should be shared, and smart and innovative solutions should be made available to all. That is why open source and open data is such an important part of Aarhus ITK's work. This is also the main idea that the pilot is meant to promote further. *GovTech* Central Denmark is an attempt to do more together and find common solutions to common problems.

In March 2018, Aarhus hosted an innovation camp as part of the Smart-Up BSR activities. More than 70 participants from Denmark, Finland, Estonia, Latvia, Lithuania, Russia, Poland, Germany and Norway participated in the innovation camp, which was the first large-scale project activity. Over the course of four days, the innovation camp focused on how to cooperate and find common solutions to the contemporary Smart City challenges and allowed the participants to share ideas, experiences and knowledge. The workshops were facilitated by Aarhus ITK and Centre for Innovation Aarhus (CFIA) and introduced the participants to the methods, approaches and initiatives, which makes Aarhus a European leader in the area.

Meanwhile, the Danish government passed a reform that affected the regional business development system. This means that the Regions can no longer engage in activities which promotes business. It also means that the Smart Specialization Strategies, which had previously been formulated by the regions, will now be formulated at the national level by the Danish Business Authority. Up to this point, the Region of Central Denmark had been the responsible actor, the pilot therefore had to be rethought.

Alongside these changes, a project group headed by Aarhus Municipality began to develop an idea to create a transregional unit to cooperate on IoT and smart cities strategically and at a larger scale than what is possible in the individual municipalities. This process has been ongoing for a while but began in earnest in the fall of 2019. During the process, the project group developed a more nuanced concept of smart cities with the introduction of *GovTech* and it was agreed that the transregional unit should focus on enabling the public authorities to explore, test and implement emerging technologies. As part of this process the stakeholder ecosystem around the *GovTech* Center was orchestrated.

The kickoff meeting in March 2020 and was attended by chief digital officers and consultants from 15 municipalities, directors from Business Region Aarhus and Business Region MidtVest and Heads of Offices from the Region of Central Denmark. A total of around 30 professionals attended the kickoff meeting. The workshops were designed and facilitated by Centre for Innovation Aarhus (CFIA) and intended to clarify the aims and activities of the *GovTech* centre and to determine a governance model, including the organization and budget.

During numerous innovation camps deep insights were gained into the local challenges and opportunities of the hosting cities and regions as well as those of the other participants. This has forced Aarhus to view own challenges and opportunities in a new light.

Future Steps

As of May 2020, Aarhus is in the process of seeking formal commitment from the stakeholders and are elevating the strategic level by involving the Municipal Chief Executives.

The *GovTech* centre will complement the individual municipalities' strategic work with Smart Cities and the national and regional priorities in the new Business Development Strategy, which is considered to correspond to a Smart Specialisation Strategy.

The network established through our participation in innovation camps and pilots, have proven of high value by allowing to extract learnings from other regions strong on cross sector, cross function collaborations. Visits and opportunities to discuss different approaches to collaboration, innovation and organization with them were enabled through Innovation Camps. Furthermore, research networks and other successful partnerships in the Baltic sea region will continue going forward as will interpersonal relationships that shape actions of high value for the future.

Estonia – Tallinn Smart City

Importance of the pilot for the region

Tallinn City has chosen smart city as the spearhead topic for its pilot to build on top of already existing competencies in ICT. Also, Tallinn City is interested to be a smart city hub in terms of RDI, practical use of new solutions and attracting companies in this field.

Tallinn City is currently involved in a large number of different projects either as a regular project partner or less so as the lead partner. The system is based on bottom-up logic. Usually it is the individual departments or other city-affiliated organisations that start or get involved in different projects by getting an invitation from a lead partner. After that the department has to show to the city's strategy unit that the project helps to fulfil the city's development plan. If strategy unit gives it accept, the department has to defend the project before the City Council. Usually most of the project ideas get the accept from both the strategy unit and the City Council.

There are several reasons why Tallinn Enterprise Department wanted to change project development processes in the city. The awareness about new project initiatives has been low in different departments of the city government. Although all projects are in a project database, this does not ensure that different departments and decisionmakers know what is happening. This led to a situation with two problems. First, different departments were sometimes involved in similar but separate projects. Second, when entering and developing new projects, the departments did not analyse how the project could impact the activities of another department.

In addition, as most of the project ideas manage to get through the strategy unit and get accepted in the City Council, there is a question of how thorough the strategy unit is as a filter. If projects are only loosely related to the actual goals of the city's development plan, then we can expect inefficient use of human and financial resources which would be needed for more important activities. Tallinn City Government envisions that by renewing its project development processes the city can:

- better evaluate each project's economic impact and link with the city's priorities;
- use financial and human resources more efficiently and effectively;
- establish a thorough overview of projects and resources in use;
- and make sure that projects are run on the same principles.

Involvement and participation

As the pilot's focus is on the city's internal processes, a wider circle of stakeholders was not involved. The implementation of Tallinn pilot is not so much dependent on the wider ecosystem as the focus is on changing the internal processes in the city. However, implementing the pilot helped to build stronger ties with actors in the local ecosystem and in the BSR region through more meaningful projects

This focus on smart city activities has helped the city to support and start several different initiatives. Some other initiatives have been more collaborative as the project has helped Tallinn City to establish contacts with different BSR partners. In addition, the cooperation between the city government and Tallinn University of Technology was also strengthened.

Pilot activities

Tallinn Enterprise Department organised the SWOT workshop in November 2018 based on scenarios developed by Helsinki-Uusimaa Regional Council. Strong ICT sector, lively start-up scene, competitive tradable services, and trustworthy internet and web environment were identified by the participants as the main strengths of Tallinn and the surrounding region.

In the context of climate change, it was found that the location of Tallinn can alleviate the negative effects of climate change and undesired migration problems. It was also noted that the region can be self-sufficient during the crisis.

Weaknesses related to the size, scale and structure (population, economy, resources), and limited attraction of talent were identified in the context of growth & globalisation. Protectionism and segregation/polarisation can harm Tallinn in two ways. First, the city functions as the country's international gateway. Second, Tallinn is smaller in comparison to other cities in the region.

The biggest threats to the region and Estonia as a whole were seen in the context of disintegration & fragmentation scenario (EU, NATO, eurozone) as the resulting risks of currency vulnerability or national security (Russia). Another aspect identified in the context of polarisation and segregation is the small size of the country and region together with two separated language groups in Tallinn City Region. Another threat identified was change in domestic policy as a response to the external developments if the new policy will focus on contraction and enclosure.

The SWOT analysis led to some of the topics and issues being included into the new Tallinn Development plan for 2021+ such as the issues with segregation in Tallinn City and attracting international talent.

Tallinn City Enterprise Department organized Tallinn Innovation Camp with ca 100 participants who were divided between seven teams to solve three challenges:

1. How to smarten up the region?
2. How to increase citizen participation and promote co-creation to improve living environment and quality of life?
3. How to make the city digital with the help of artificial intelligence and co-creation?

Amongst the participants were representatives and experts from other partner organisations of the project, city officials and master's students. The challenges were very strongly focussed on how to improve urban space and utilize digital solutions in the city. Several interesting solutions were pitched by the participants.

One of the ideas under Challenge 1 was an app which by using gamification features would provide users a possibility to map out areas that need improvements (e.g. large piles of

trash, infrastructure that needs repairs etc). The second idea under Challenge 1 was a collaboration platform targeted towards apartment unions. Two ideas were pitched under Challenge 2 which focussed on revitalizing old ABC centres and closing the gap between the city government and local communities by hiring community managers in large apartment block areas. Challenge 3 focussed on AI and two ideas were pitched: an AI solution which would manage the traffic flow, and an AI-based reporting tool for citizens.

The Innovation Camp format has been adopted by the Tallinn Science Park Technopol. It has developed its own innovation programme called Momentum which is offered as a service for companies and public sector organisations to develop new products and services.

More information about Momentum can be found through the following link: https://www.tehnopol.ee/en/momentum/momentum-case/.

Several ideas developed during the camp have moved forward. For example, the use of AI in traffic management was an idea under discussion in Tallinn City already before the innovation camp, the event and the pitched idea gave an additional push to move forward with it.

The first pilot activity was the writing of the report by the Baltic Innovation Agency (BIA). The aim of the report was to compare Tallinn City to other important cities in the region from smart city perspective. This list included Helsinki, Riga, Vilnius and Copenhagen. The report looked at where these cities are located in different (smart) city rankings and what are the most notable smart city developments/initiatives in these cities. BIA also conducted a SWOT analysis by interviewing a number of experts from the local smart city ecosystem and using previous analyses, different strategies and the previous Smart-up BSR SWOT analysis. Based on this analysis, BIA provided a number of recommendations for Tallinn City such as supporting real-life piloting, organising smart city hackathons, bigger use of innovation procurements.

In addition, BIA developed a smart city project assessment tool for Tallinn City which could be used to assess all new ICT and smart city project ideas. The assessment tool focuses on risk assessment and potential benefits that the project can bring in different areas (economy, governance, environment, people, living, energy efficiency, mobility, ICT). This new assessment tool will play an important role in renewing project development processes in the city.

The role of the assessment tool is to provide an ex-ante evaluation for project proposals. Projects that get a score of at least 60% both through the assessment tool and from the experts will move to the selection round. The selection will be made by a committee which consists of experts from different city departments but also from outside

Results

As part of its pilot, Tallinn City together with the Baltic Innovation Agency has developed a smart city project assessment tool (described earlier) which the city plans to use starting from this summer.

In cooperation with Tallinn Science Park Tehnopol, Tallinn City has launched its own innovation fund called Tallinnovation to find and implement smart city solutions in Tallinn. The fund distributes funding on a competitive basis. The goals of Tallinnovation are:

- to support cooperation between the City of Tallinn and technology companies by enabling the use of innovative software or hardware products in the City of Tallinn;
- to support the City of Tallinn's ambition to make the city environment more modern, sustainable, citizen-friendly, and open;
- to introduce innovative smart city solutions, products, and services to the City of Tallinn;
- to raise the awareness of Tallinn City employees and officials about new possible innovative developments in the urban environment.

More information can be found through the following link:
https://innovatsioonifond.tehnopol.ee/en/#goal

Tallinn City has financially supported the establishment of smart city professorship in the School of Engineering at Tallinn University of Technology. A number of other stakeholders have been involved with the establishment of smart city professorship such as Ericsson, AS Mainor and different private companies located in Ülemiste. Together with Technopolis, AS Mainor is the major developer of Ülemiste area. The company supported the establishment of the professorship with 500000€. In addition to research in smart city area which by nature is interdisciplinary, the aim of the professorship is to support the collaboration between Tallinn University of Technology, Tallinn City, private companies involved in the development of smart city solutions and real estate developers in Ülemiste.

Results can also have a wider impact at the BSR macro-region level. If this new approach helps the city to prioritise human and financial resources, Tallinn City could be involved into larger and more wide-ranging projects.

Further steps

The actual implementation planned for summer 2020 will experience a delay because of the Covid-19 pandemic as well as due to structural changes in the city government. The restructured city units will take the pilot results further as soon as they are operational.

At the moment, Tallinn City is one of the six partner cities (other cities include Amsterdam, Helsinki, Paris Region, Copenhagen and Stavanger) in the AI4Cities project where the idea is to use pre-commercial procurement process to procure AI solutions in the fields of energy and mobility to move towards carbon neutrality. The City of Tallinn has shown interest to use this project to procure an AI solution for traffic management based on the pilot ideas.

Tallinn City is also a partner in the project CENTRINNO. One of the initial reasons why Tallinn joined the project was the potential to test out the idea of having community managers.

For future implementation it was identified that alignment with Scandinavian countries is the biggest precondition for favourable business opportunities (Scandinavia as the home market, joint sales and promotion abroad). Pan-regional development can be facilitated

through meso-level strategies, e.g. Baltic Sea Region Strategy. Trade barriers can create opportunities in the context of lesser competition from Asia. Liberal migration can provide access to talent beyond the EU, mainly Ukraine and Belarus.

Finland – Helsinki-Uusimaa Active and Healthy Aging on the Move

Importance of the pilot for the region

Helsinki-Uusimaa as smart region is specialising in technology, wellbeing, cleantech and digitalisation. In each of these areas different players from the whole region - business, cities, public sector, research, education centres, start-ups and the citizen - create smart innovations and tests together.

The Helsinki-Uusimaa region includes cities that takes sustainable development very seriously and concentrates efforts towards a safe, healthy and functional everyday life. Helsinki is for a good life.[2] Espoo is gearing to be a carbon neutral city by 2025 and is working to be a forerunner in the UN sustainable development goals.[3] This can be achieved through Espoo's values, attitudes, operating culture and common goals.

This Smart Specialisation strategy for Helsinki-Uusimaa promotes the economic development of the region with the help of the latest information and new innovative solutions.[4] Therefore the region chose to run a pilot to map the overall network action in the region in the sector of health and wellness. The pilot of Helsinki-Uusimaa aims for more effective coordination of local stakeholders' efforts hopefully leading to novel action, research, and innovation in the Active and Healthy Aging (AHA) sector. Here the target group are the public and private actors involved in developing AHA measures and bringing active and healthy ageing into practice. The pilot seeks to find common ground between AHA activities and the digital health care

The goal of mapping the regional network action in active and healthy aging is to find ways to enable different stakeholders to strengthen the networks, to learn from each other and to form combinations of skills. The mapping exercise will foster both local and cross border co-operation in the Baltic Sea Region. BSR regions will benefit of new visions and collaboration possibilities on the AHA theme.

For Helsinki-Uusimaa Regional Council the role is in catalysing and promoting active and healthy aging – related initiatives and to facilitate a more coordinated approach. In addition, the goal is to attract international funding and projects towards policy formation (especially related to RDI).

The exercise of mapping AHA-actors was considered important for Helsinki-Uusimaa as well as for a wider cross-regional collaboration. We decided that after mapping the AHA network for the region it would be fruitful to share both the learnings and information gathered to international partners.

[2] https://www.hel.fi/helsinki/en/administration/strategy/strategy/city-strategy/

[3] https://www.espoo.fi/en-US/Espoo_to_become_a_forerunner_in_the_UN_s(144094)

[4] https://www.uudenmaanliitto.fi/files/24986/Smart_specialisation_strategy_for_Helsinki-Uusimaa_Region.pdf

Involvement and participation

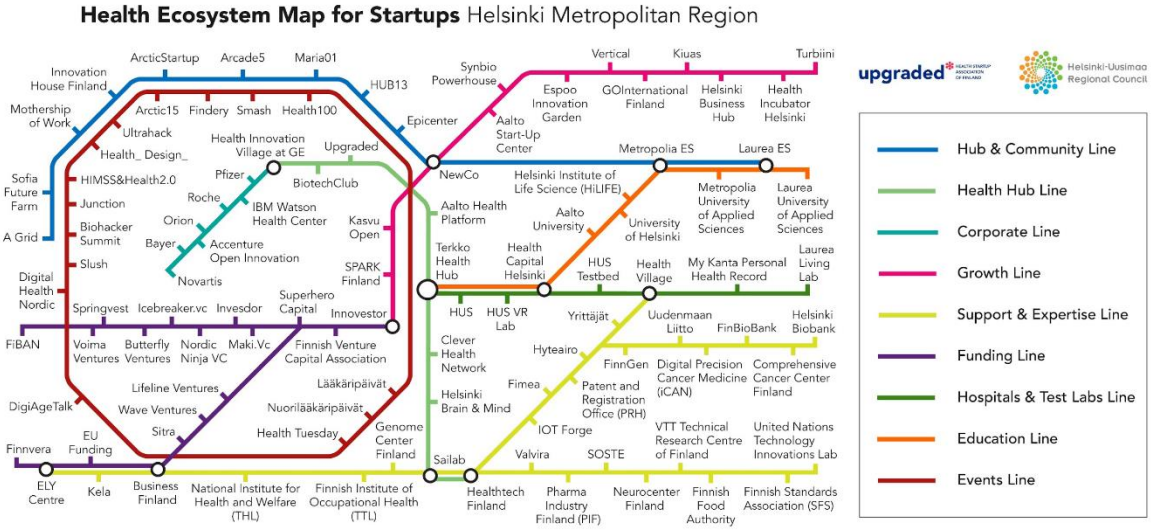
Participating stakeholders functioning as main actors and being committed to collaboration were:

Publicly funded Social Sector Knowledge Hubs, e.g. KELA (The Social Insurance Institution of Finland), THL (Finnish Institute for Health and Welfare), Health Capital Helsinki; Helsinki Business Hub, Terkko Health Accelerator, Socca (The Centre of Excellence on Social Welfare in the Helsinki Metropolitan Area), Laurea University of Applied Sciences.

The contact with the above organisations has been consistent and has included several iterative conversations with management or with active and healthy aging (AHA) -related experts in these organisations with the aim to find specific interest areas and role validation as well as finding leads to other actors´ involvement.

Pilot activities

A SWOT-analysis of the Region´s capabilities was drawn in the early stages of the Smart-up BSR project. The aim of the analysis was to find strengths and opportunities as well as weaknesses and threats for Helsinki-Uusimaa in the future. The analysis was made to give background for preparation of our new Smart Specialisation strategy. One of the findings was that we have the elements for strong RDI ecosystem, but we still need to boost the cooperation between actors and enhance the sharing of information. This piloting of mapping the information of actors on a specific field and sharing the information to be used by the actors in the ecosystem is one answer to this need.



The cross-regional activities in the Smart-up BSR -project have linked us more closely to the partnering regions. Most important has been the knowledge and personal contacts in the field of Smart Specialisation strategies that we have gained. The project has given us a wider understanding of the different ways to prepare and implement a strategy for Smart Specialisation. The local stakeholders who participated especially the representatives from

the Urban Mill Innovation Platform could share their experiences of running a local innovation ecosystem and get access to new partnerships in the BSR-region. There is a great potential for future connections on the active healthy ageing -sector once the piloted mapping of actors will be further developed to be a digital tool.

The mapping decision underlines the collaboration of stakeholders based on the common goal to perform pilot measures for a holistic and cross disciplinary understanding of the Helsinki-Uusimaa AHA ecosystem stakeholders, their insight, expertise and strategic goals. This mapping pilot aims for more effective coordination of local stakeholders´ efforts hopefully leading to novel and new AHA actions, research and innovation.

Several informative encounters with professional caretakers and social health expert organizations in 2019 included discussions with relevant stakeholders which resulted in further mapping for a deeper understanding of the stakeholder network and health ecosystem.

In 2020 followed a final ecosystem mapping focused on regional active and healthy ageing actions which provided a compilation of the data and feedback. Links were made to other Nordic organisations that have interest in mapping and the related heavy work related to keeping data fresh for better interest and usability.

Results

The result of the pilot was an updated view of the actors working in the sector of Active and Healthy Ageing. This includes new information on the specific fields they are working on. Without this kind of mapping our connections would be limited mainly to big companies and dominant actors. The mapping gives us a wider view that incorporates small organizations. It helps us find best ways for different stakeholders to strengthen AHA networks, to learn from each other and to form combinations of skills.

Sharing the mapping results will give the regions new visions and open collaboration possibilities on the AHA.

The pioneering impact of this pilot beyond the BSR macro region may be significant, especially if a common data model is being developed, commitment for a systematic updating of the data is established and the data would be made easily available via an internet hub or portal. We aim for moving into this direction, in conjunction with other endeavours mapping the broader Health Care (HC) actors in certain Nordic Regions and Cities.

Future Steps

The key benefits of the mapping tool and the actual ecosystem map are:

- Facilitating more coordinated and timely development approach, agenda, and priority setting
- Learning from close but currently siloed partners
- Improving and catalysing personal contacts and matching interests
- Avoiding double or suboptimal efforts.

Our original idea was to link this pilot to the work of European Innovation Partnership of Active and Healthy Ageing (EIP on AHA). During the planning process the status of our region within the partnership changed and the pilot needed to be updated accordingly. Rethinking the pilot was necessary as the City of Helsinki withdraw from the EIP AHA network as a reference site which would have benefited the linkage to the European Innovation Partnership on Active and Healthy Ageing.

One of the main learnings of this process was, that the work needs to be adequately resourced. Even when we have the information collected putting it into informative and user-friendly format requires professional skills. That is why we are still working with the final format of the mapping.

We hope to be able to have significantly wider visibility on the results by incorporating a complementary AHA - line into the broader mapping exercises we are conducting which charts organisations/services linked to ageing.

This pilot mapping gave us a view of the actors working in the sector of ageing. It also gave us information of the specific field they are working on. With this information we can develop further the orchestration of the AHA ecosystem in the region. This is also a very helpful tool in building international connections and finding right partners regionally and internationally. In the future we need to decide how to update the mapping regularly. To gain attention, the most useful approach would be to make it available in the web. Regular updates are a known challenge for all mapping exercises, and we are keen to tackle this together with potential users and technology providers, pending of resources and interest. The current mapping will be distributed to the attention of the relevant networks and actors.

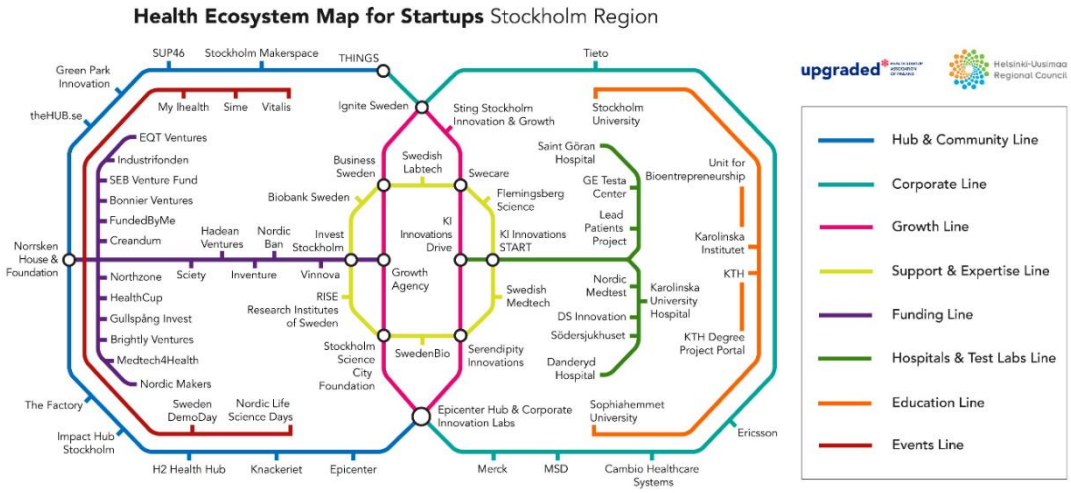


Figure 1 Stockholm Region health ecosystem map for start-ups

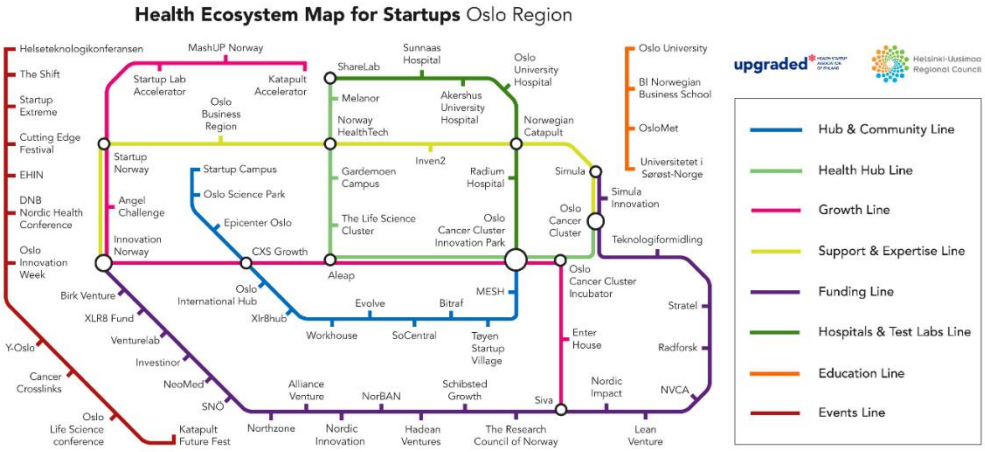


Figure 2 Oslo Region health ecosystem map for start-ups

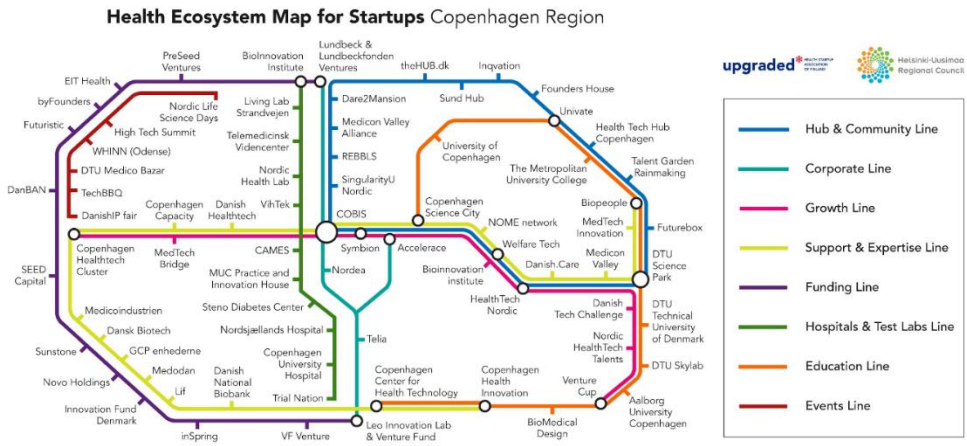


Figure 3 Copenhagen Region health ecosystem map for start-ups

Finland – Kymenlaakso Smart Ports

Importance of the pilot for the region

Kymenlaakso is a region located in the South-East of Finland on the coast of the Baltic Sea and on the Gulf of Finland. The geographical location and history have been of great importance to the region when selecting a certain spearhead. Kymenlaakso is one of the most significant forest industry clusters in Europe and an international hub of logistics and logistics related business and knowhow in the Baltic Sea Region.

Finland´s largest universal export and trans-shipment port, Port of Hamina-Kotka, is situated in the region as well. Kymenlaakso´s economy has relied and still relies heavily on its operating ports and port related activities (especially logistics). This is essential for the region.

Port-related activities and business have a long tradition in the region, valuable know-how and relationships have been accumulated for decades. Currently, the Kotka-Hamina port areas are being developed very strongly and new substantial investments have been brought out to the public during last few years. Lots of projects are presently going on in the Kotka old port area, which further emphasizes and increases the importance of region´s port areas and related development activities to the economic well-being of Kymenlaakso (particularly for the Southern part of the region i.e. Kotka-Hamina region).

Kymenlaakso region implemented its Smart Specialisation strategy process during 2015-2017. At the end of the process three spearheads were chosen for the region's research and innovation strategy for Smart Specialisation (RIS3) for 2016-2020:

- logistics (safety and intelligent logistics)
- bioeconomy (new products and business from resource-efficient and low-carbon bio- and circular economy)
- digitalization (cyber security and gamification and digital applications in logistics and bioeconomy as well as in tourism and health and well-being).

The development of smart ports as a sub-theme is closely related to Smart City theme. Collaborating port cities (Tallinn, Aarhus, Klaipeda, Gdansk, Kotka, Stockholm and Helsinki) are interested in this initiative within the Smart City theme.

Smart port related developments were therefore envisaged as the most suitable spearheads for Kymenlaakso's pilot project. Themes of sustainability and circular economy have begun to gain prominence in the last couple of years. A strong growing trend is that port areas attract investments in bioeconomy and renewable energy. This shows that all today´s developments and investments must have an ecological aspect to consider in some way and the Kotka port areas are putting this into practice.

A joint working group of all actors was set up in the region by Regional Council of Kymenlaakso to work on updating the Smart Specialisation strategy. In the context of this, all the existing innovation services and resources, as well as possibly lacking ones, can not

only be identified and described but also brought together for action. This working group serves as a joint platform for intensified cooperation on selected strategic spearheads/ areas (e.g. establishment of joint innovative projects).

In Kymenlaakso, in the city of Kotka, a Kotka Old Port area regeneration project is a huge ongoing effort which takes a lot of time, resources and substantial investments. The overarching vision is to transform a brownfield area situated on the seaside and in the city centre to a mixed-use area in a sustainable manner. The whole area will be built and converted into a modern centre where business, university of applied sciences, development company, citizens, authorities etc.

The aim of the smart port pilot is that the region´s innovation actors will benefit from novel synergies, have access to new networks, opportunities and cooperation which are enabled by favourable surroundings, conditions and processes created by this innovation ecosystem.

Involvement and participation

The main stakeholders/ local actors of the local place-based innovation ecosystem are:

- Universities & research institutes: South-Eastern Finland University of Applied Sciences (Xamk), Kotka Maritime Research Centre
- Relevant companies (spearhead): Port of HaminaKotka, Empower Oy (regional forerunner in smart factory development), Finnhub Association (a national logistics company network).
- Public organizations, Regional Council of Kymenlaakso, the city of Kotka, Cursor Oy, Kouvola Innovation Ltd, Kymenlaakso Chamber of Commerce, entrepreneur organizations
- Civil society organizations (representing citizens/consumers): Kotka Youth Council.'

South Kymenlaakso Vocational College and Kouvola Region Vocational College are also actively developing regional ecosystem especially via regional, national and international collaboration projects.

Involvement and participation to promote three potential pilots in 2019 included:

Gisgro Port Digital Twin Project

- Representatives of Port of HaminaKotka and new port development related operators were included in cross-regional innovation camps around the theme of port development
- New participants from Finnhub association (logistics expertise and innovation network) www.finn hub.fi/en/home/ and Empower Oy (smart city/ digital and expert service) www.empower.fi
- Both company representatives and representatives from the city of Kotka were invited to participate Portathon Baltic 2019 in Klaipėda.

Kotka Old Port Project- A Sustainable Hub by the Sea

- Cooperation project between the city of Kotka and University of Helsinki (students participated in real-life challenges / questions in innovation camps).

- Representatives from the city of Kotka were invited to participate Portathon Baltic 2019 – port technology hackathon in Klaipėda.

In addition, cross-regional collaboration in Innovation Camps led to another initiative:

Cross-border network of youth

- Collaboration with Aalto University.
- The core of the student initiative is to form a 'sub-official' group in building up a network of youth for sustainability in the BSR.
- Kotkan lyseo, a certified educational institution for sustainable development
- and local schools and youth organizations to promote the pilot idea addressing climate change and sustainability questions.

In Kymenlaakso one mechanism for engaging different stakeholders in the future is via Smart Specialisation expert working groups work (one group dedicated to certain strategic spearhead). These groups were set simultaneously with the finalisation of Smart Specialisation strategy process and the chairmanship and composition of the groups have changed several times after the initiation. This reflects the changes in the surrounding environment and the necessity to adapt to the ecosystem´s changing needs.

When thinking of the regional ecosystem´s role in supporting innovations, a certain thing stands out strongly: Kymenlaakso region is geographically a relatively small area and all the relevant innovation actors know each other quite well. The communication and contacting between actors are smooth, fast and straightforward.

Pilot activities

The methodology of pilot planning was discussed with partners (stakeholder mapping and scanning for relevant projects and initiatives). For the Kymenlaakso region possible pilots could address the development of Kotka port area and/or "e-Kotka" (development of digital services/ solutions for people). These two were chosen because they were already existing regional initiatives which can be connected to cross-regional/EU level projects for building up synergies and increasing impact.

Finally, from Kymenlaakso´s perspective a broader theme of Smart City/ smart port was seen as the most promising priority topic for piloting

Planning for the Innovation Camp including challenge formulation started in early 2019. Helsinki-Espoo-Kotka Innovation Camp on Sustainable Baltic Sea Region 2030 took place on in Otaniemi (Espoo) and in the City of Kotka. The camp was organized by Aalto University in cooperation with Cursor Oy.

In the process of formulating challenges for the Kotka leg of the innovation camp the city of Kotka/port of Kotka provided a real-life challenge. In collaboration with University of Helsinki´s students' different real-life problems/ themes of interest from the collaborating partners were examined.

The real-life challenge from the city of Kotka was delivered forward to student group to be worked on:

- How to combine digitalization, sea and people into sustainable business opportunities in the developing Kotka Old Port area?

The work continued with joint events including student groups and challenge owners/ partners. The final output of this collaboration was presented to challenge owners/ the representatives of the City of Kotka and other stakeholders and provided new insights and ideas on how to develop and orchestrate innovative activities in Kotka Old Port ecosystem.

Lessons learnt from previous innovation camps especially held in Aarhus/ Denmark, Klaipeda/ Lithuania and Gdansk/ Poland have been inspiring and useful in visualizing and picturing what kind of structures, operations and activities could be included in port area-related development processes and in Kotka-Hamina region. Visions for the development of the Kotka Old Port area include:

- Local entrepreneurship
  it shapes the place into a commercial form
  it gives local actors of all ages a chance to support their community
  it allows goods to be produced near-by
  it supports local sustainability
  it supports the tourism aspect.
- Extend the natural look and maintain it green
  it secures preservation of several renowned and awarded parks
  it gives local actors of all ages a chance to support their community
  it supports local sustainability
  it supports the tourism aspect.
- Sustainable city planning and development
  it secures adaptive reuse of buildings/ warehouses
  it gives a new purpose to a building and provides space for activities
  it keeps the history of that place intact, creates strong community
  it supports local sustainability.

The Kymenlaakso region´s Smart Specialisation strategy related SWOT synthesis exercise was started already in 2018. All relevant innovation actors/ stakeholders (Regional Council of Kymenlaakso, Kouvola Innovation Ltd., South-Eastern Finland University of Applied Sciences) and leaders of thematic Smart Specialisation working groups (logistics, bioeconomy and digitalization) were invited to contribute and participate in a SWOT workshop. The goal was to deploy the Smart Specialisation strategy process to forecast and better understand the region´s future development via scenarios and SWOT analysis. The scenarios were essential tools in mapping the possibilities and risks of the region´s

alternative futures and to analyse in an open and interactive co-operation the region´s strengths and weaknesses as well as opportunities for further development.[5]

The resulting characteristics for Kymenlaakso region were:

- forests and bioeconomy-based products (=S),
- structural change region and unfavourable population structure (=W),
- expertise in utilizing digitalisation and tourism (=O),
- weak/low competence base and outmigration to growth centers (=T).

This exercise showed regional strengths and opportunities and most importantly weaknesses and threats which need specific attention and building of new competence and collaboration. With this exercise it was possible to analyse what kind of competences should be fostered and developed internally and externally in order to manage in the future.

The SWOT workshop and its findings was a good starting point and a boost for Kymenlaakso region to revisit its Smart Specialisation strategy, review critically the validity of the strategy and assess the need to update it. A concrete result was to take preliminary steps in discussing and planning on how to proceed with the process of strategy update: who to involve and how to ensure that relevant input from specific innovation actors will be received.

It was decided that all three Smart Specialisation expert working groups should be gathered together to share views and experiences from past operations and activities in a varied group of representatives. 19 representatives participated from Cursor Oy (six), South-Eastern Finland University of Applied Sciences (six), Kouvola Innovation Ltd. (=region´s other development company in the north; two), Kotka Maritime Research Center (one), company representatives (two), and representatives from Regional Council of Kymenlaakso (two). This updating process was planned to be a joint effort engaging region´s all relevant innovation actors. The process coordinator and orchestrator is the Regional Council of Kymenlaakso.

Finally, the region dedicated some efforts to activities towards establishing the BSR Youth Network pilot:

- 2019, discussions with Aalto University about building and planning the network, possible target groups and action plan for proceeding before approaching regional parties (e.g. high schools/ teachers) with a concrete and attractive “offering”.
- Kymenlaakso’s most promising school to recruit into the pilot Baltic Sea Region Area Youth Network was Kotkan lyseo, a certified educational institution for sustainable development.

[5] The 5 different scenarios (1: Protectionism and traditional government power, 2: Polarized individualism and expert power, 3: Reliance on local communities, 4: Global and networked tech-imperialism and 5: Growth and EU-driven international co-operation) were based on the synthesis work done by all Smart-Up BSR project partners. These different scenarios describe alternative future developments in the operation environments by 2050.

- Partners were asked by Aalto team to get in contact with local schools and youth organizations and promote the pilot idea addressing climate change and sustainability questions.
- 2020 the youth council of the city of Kotka was approached to join the Riga innovation camp.
- Kymenlaakso widely disseminated the BSR Youth Survey to local educational institutions, where the target age group of the survey can be found.

Results

The port-related piloting benefited the local innovation ecosystem in the following ways:

- Links to new partners operators that bring added value and competence
- New expertise for the local innovation ecosystem especially relating to port area.
- Boost to the exploitation of new smart/ digital services and applications.
- Upgrade of ICT/ digital operating environment in port area.
- Increase of the role of ports in maintaining and attracting new industries and logistic activities to region.

The engagement of University of Helsinki´s students on the project 'Kotka Old Port - A Sustainable Hub by the Sea' emphasized the need to improve accessibility to other relevant areas in Kotka, e.g. the urban national park and the unique features of a city by the sea. The work presented several concrete ideas with which to enrich and enliven the port area with innovative sustainable entrepreneurship.

The role of local entrepreneurship was emphasized because it can really shape the port area into a commercial form while giving the locals a chance to support their community and get goods produced nearby. This also supports the tourism business aspect. Sustainability was highlighted in all city planning and development. This could be realized e.g. via adaptive reuse of buildings/ warehouses which could give new purpose/ life to old buildings and provide space for new activities and business. From cultural and excitement point of view new events that get the attention of people and create good memories could be organized (pop-up events such as restaurant days, start-up activities, circular economy and collaborative consumption related functions).

Port of HaminaKotka presented their novel Gisgro Port Digital Twin Project demonstrating 3D model of the port areas for maintenance of the underwater and surface structures. This was perceived as a possible case that could be utilised for cross-regional pilot planning i.e. introduced and piloted also in other partner regions. Initiatives were made to match interested parties from e.g. Poland and Lithuania with Port of HaminaKotka representatives.

Noticeably the city of Kotka has taken a more active role as an enabler in regional ecosystem. In Kymenlaakso region an excellent example of a city being an enabler is Kotka Old Port regeneration project which was tied up with the planning and execution of a cross-regional Innovation Camp. The city has been an orchestrator for innovative projects and a co-creator and tester of innovations. Some of the activities have been inspired by the Smart-up BSR project.

From the region's point of view the piloting exercise boosted the use of Smart Specialisation strategy in a concrete way. The interactive tools gave an excellent opportunity to train predicting future scenarios, pinpoint specific development needs, develop strategic foresight thinking and intensify co-operation and interaction with region´s different innovation actors. From Kymenlaakso´s perspective lacking regional competences could be complemented with collaborating especially with project partners from port cities.

In the youth network collaboration pilot, ideas for a cross-border network to connect youth in BSR and increase youth influence and collaboration on sustainability issues were still very fragmented to be provided to further stakeholders. With a clearer plan and goal the youth network can expand to proceed regionally.

Future steps

Some lessons learned during pilot planning of the pilot from the organiser's point of view:

- it has been tricky in the beginning to figure out the essentials of pilot planning.
- projects with earmarked budget to execute new pilots are easier when selling the idea to potential regional pilot partners
- finding out which already ongoing development plans/ initiatives in BSR and which expertise would bring added value to the region requires a lot time.

As far as challenge owners (especially land use planning) were concerned, they were very interested in exploiting the work results in their future work, though currently there is no suitable ongoing project to implement the Kotka Old Port Project idea presented by the students. The idea is though well remembered, and it has strong potential to be utilized via temporary use of the Port area.

The development of the port related pilots could have progressed faster if overlapping obligations could have been avoided among the region's relevant actors; due to pressing pilot schedules the program and challenges of the innovation camps were communicated on short notice. However, the development of the area is a multi-year process and e.g. the vacant warehouse buildings in the area offer testing opportunities for many activities. Presently COVID-19 pandemic has affected heavily on region´s port activities and operators and promoting cross-regional pilot cooperation is delayed.

Promoting and participating in cross-border network of youth pilot seems instead to carry a lot of potential. COVID-19 pandemic naturally hinders physical meetings, but pilot leaders are striving to arrange video conferencing to include numerous participants from BSR countries. We hope, that the youth council of the city of Kotka will engage in dialogue with the cross-regional youth network since the city of Kotka is in the middle of the updating process of its climate program for the coming decades and also the youth council will be involved to this process.

Projects have traditionally been the most important means of regional development in Kymenlaakso region. Nowadays access to structural funding is constantly tightening and competition for funding between different actors is also becoming more intense. International cooperation and joint projects will play even a bigger role in the future.

Latvia – Regional Capacity Building

Importance of the pilot for the region

The Latvian Ministry of Education and Science (MoES) has the role to foster an innovative, wealthy and integrated society in which everyone has equal opportunities for development, therefore the goal of the Latvian pilot was to ensure that Smart Specialisation strategy is implemented successfully.

MoES' pilot aims at supporting partners, and establishing necessary amendments to the existing Smart Specialisaiton strategy and implementation plan by doing close and accurate monitoring. This is done by facilitating dialogue with the stakeholders, by sharing information and providing extensive explanation to the relevant policies, and participating in all stages of decision making.

Latvia is progressing towards a globally connected R&I system. Comparing to other EU countries, Latvia has a weak track record in R&I, though it can currently boast with what can be considered islands of excellence. Still, relatively weak links with industry need to be improved. R&D systems are still passive and re-active in steering socio-economic impact. Therefore, the decision to engage with this pilot was to learn from others and work on new approaches where possible.

Latvia envisioned an economical but also social impact as outcomes from the project and a better support in the implementation of the Smart Specialisation national framework.

Capacity building was a main focus. For example, expectations were directed towards better solutions for closing skills gaps, or to better management of water resources, or to improved education and links between the academic and the business communities by sharing an interdisciplinary circular economy approach.

Involvement and participation

The Triple Helix approach was tested, and the main target groups were R&D institutions, higher education institutions, entrepreneurs, municipalities and other ministries.

The methods used to promote, advertise, recruit, create awareness were: Support and discussions with universities, research centers, businesses other public bodies.

We proactively tried to communicate and collaborate with relevant stakeholders, especially stakeholders that were interested and had regional or sector specific knowledge, expertise or experiences helpful for Smart Specialisation national strategy implementation and monitoring. Universities, research centers, businesses, municipalities and other ministries participated in the activities.

Pilot activities

MoES took part in several encounters and interventions, by participating in numerous meetings with national and regional stakeholders (municipalities, ministries, scientific and research institutions, universities and businesses).

Activities focused on leading a dialog on issues of implementation and capacity building to secure its success. The various meetings discussed aspects of circular economy, bio-economy, IT advancements, technology transfer and other new initiatives, programs and

projects that can be used for better implementation of the national Smart Specialisation strategy.

The activities included supporting other partners in Latvia involved in pilot projects linked to the Smart Specialisation national framework.

Results

The Smart-up BSR pilot allowed us to expand the existing network with regional level stakeholders, but also to engage and support other partners from Latvia. For example we supported the University of Latvia and the University of Liepaja in linking their pilot projects to the Smart Specialisation national framework. Thus, we paid more attention to directions like Smart Cities (advanced IT) and circular economy (knowledge intensive bioeconomy).

By participating in the innovation camps, the Smart-up project manager and Smart Specialisation experts from MoES gained insights and knowledge based on societal challenges which need to be considered when performing the monitoring of Latvian Smart Specialisation strategy and implementation of related activities.

A major outcome of the pilot was to learn different practices around the Baltic Sea in Smart Specialisation planning and implementation, regional capacity building and also to establish new networks.

Cross-regional cooperation was very relevant to learn practices in other countries and regions, as well as to discuss further cooperation and new project opportunities.

For the MoES cross-regional cooperation is important because investment as well as policy focusing on R&D aims towards international collaboration to ensure competitiveness and excellence through technology and knowledge transfer.

International collaboration is also needed for sufficient human capital in R&D to foster economic transformation. Therefore R&D capacity development in academic, science and business sectors is aligned with Smart Specialisation priorities.

Future steps

Sector specific information regularly needs to be updated and monitored in at least the regional context to achieve better and more accurate focus and ensure engagement with all the stakeholders (policy makers, R&D sector, entrepreneurs, students and general public), providing updates on challenges and opportunities.

Currently MoES is working on new policy planning document that will revise and update existing Smart Specialisation strategies for next funding period. The Smart Specialisation strategy for Latvia is already in its implementation phase, but after its revision it is very likely that implementation of related activities will be changed accordingly.

With each innovation camp MoES experts gain new experience on how to tackle different aspects of Smart Specialisation development and implementation, e.g. societal challenges in the region, ways of establishing dialogue between stakeholders, coordinating the bottom-up process, etc.

Latvia aims for higher degree of international co-operation for improvement of position among EU innovators and actual impact of the research, as well as more successful cooperation in international project openings.

The future impacts for the Baltic Sea Region are: Cooperation for new project applications (e.g. in circular economy sector) and networking, new contacts.

The House of Technology – University of Latvia

Importance of the UL pilot for the region

The University of Latvia (UL) is the leading national most influential university in Latvia and therefore has an important role in the development of the education system as well as the economics of Latvia. UL has chosen the House of Technology as a Smart-Up BSR pilot. The activity is part of the development of the UL Academic Centre which started in 2004 with the endorsement of the University's "Development Strategy 2004-2010". The Academic Centre implementation is carried out in three stages: first, building of the house of Nature (2015), second the House of Sciences (2019) and the House of Letters (to be completed in 2023). Stage three projects of the Academic Centre development programme include such projects as:

- House of Health – an outpatient care, study and research complex, including the family doctors Competency Centre and the Sports Science Centre;
- House of Technologies – Life Science, Material Sciences and High Energy Radiation Technology Centre;
- House of Champions – sports complex, sports science and functional medical centre;
- House of Students and Guests – student dormitories and social support infrastructure, apartments for employees, guest lecturers and guest researchers.

The House of Technology project represents a concept of the technology transfer centre fostering development of innovations in three main specialisation fields according UL Smart Specialisation directions (Radiation chemistry and physics; Materials, mechanics and prototyping centre; Life Science centre).

The House of Technology is intended as a pilot project ("city within city") that implements Smart City guidelines (smart energy supply and measurement, open data, smart lightning, smart mobility). Afterwards, the concept is planned to multiply to other buildings of the campus and on the next level - to the market.

It was recognized that the technology centre has to be modular in order to be able to accommodate new directions. This concept came from working with the long list of proposed equipment. A method for evaluating the potential of the proposed directions of research and proposed list of equipment was devised. Thus, the concept is developed to be able to validate unnumbered different scientific directions/units and to prove their viability and marketability.

This includes both the financial (returns, payback estimates) and non-financial criteria (market response, fit with strategies, synergies with other directions).

The approach to the project was tightly related to the roadmap set forth by the regional (Latvia) Smart Specialisation strategies on the one hand and to the specific needs and goals of involved stakeholders. The House of Technologies addresses these by creating infrastructure and organisational platform for technology transfer. Also, in Latvia, the Smart Specialisation strategy corresponds with the national research and innovation strategy for economic transformation.

The core criteria for allocation of public resources reflect the local policies and the public preferences. These criteria were considered as a basic validation of the direction envisaged by the House of Technologies. The criteria among others include:

- Growth of S&T human capital (knowledge and networks), expressed as increased
- competence of individuals engaged in projects and opportunities to increase multidisciplinary research and innovations and an increase in research capacity through university graduates;
- Scientific excellence, characterized by the level of usefulness of new knowledge for future or present economic and societal challenges;
- Net economic value or today's financial and social benefits that project will create.

As for the perspective of the owner of the initiative and the pilot of the House of Technology the project was built to align with the strategic intents of the of University, which include:

- improving its competitiveness within BSR region through its scientific institutes
- raising the potential and governance of the intellectual property
- increasing the international reputation and ratings.

Involvement and participation

A number of different groups of stakeholders were included in the development of the pilot. The scientist affiliated with the University of Latvia camp up with more than 150 different ideas suitable for the project.

Local and regional expert were employed to evaluate both the substance of the ideas and also the financial and commercial assumptions behind the proposed ideas.

A further challenge includes finding a way to coordinate various similar initiatives over the BSR with an aim to eliminate ineffective use of scientific equipment and allocation of resources. The concept of specialisation (and Smart Specialisation) could be seen as a way forward, so that each hub of technology transfer within region would be much aware of the general direction chosen by other players.

Pilot activities

The Smart-Up BSR innovation camp held in Riga in February 2020 addressed several issues, the solutions of which were directly related to the pilot project of the House of Technologies.

- "Long-term cooperation between business, academia and public sector to foster innovation". The group challenged the Triple Helix -model based challenge setting by adding citizens to the challenge, just like theorized in the Quadruple Helix model. One of the key findings for how to keep the system running as smoothly and efficiently as possible is to increase TRUST between the different players.
- “Promoting the communication between the holders and users of the science infrastructure”. Part of the challenge could be solved by developing new department in the universities which combine all the infrastructure, researcher contacts and is responsible for infrastructure usage, sharing, maintenance and services.
- “How to help the innovations to leave the scientific laboratories and interact with commercial sector and society.” The challenge was specified, and three area of issues emerged: Motivation of scientists to attempt commercialisation of their innovations, organisational and physical infrastructure improvement, maximising the market. Surveying scientists for ideas (scouting technologies) was identified as the very first step. This would enable creating collaboration platforms, creating databases of research initiatives and investor requests, organising informal gatherings and ongoing expos of certain technology.

Parallel to the Smartup BSR Innovation camp a conference “Innovation – power of the 21st century” was held. This resulted in signing of a “Riga declaration” which emphasizes the cooperation of the signing parties in the fields of 3S strategies, development of knowledge-based society and economy and cooperation in an innovation-friendly economic environment.

Based on the recommendations of the European Investment Bank regarding the need to create the Innovation Centre House of Technology within the University of Latvia Academic Centre as a regional innovation centre, and on the Riga declaration Latvia together with BSR partners should develop a targeted financial platform for development of innovations from technology readiness level (TRL) 3-4 to TRL7.

The platform established by Riga declaration would help both for pooling financial resources and also creating networks of competencies, which is important for successful realisation of the House of Technologies.

The following activities in the House of Technology pilot project were carried out:

- The longlist of proposed research ideas and required equipment was created and market research conducted in order to determine supply/demand for research services, and to establish the most optimal use of the equipment and the required investment amount.
- A series of meetings was conducted with the research personnel and external consultants to identify and analyse the research services needs and what are the underlying and associated costs, and possible revenues streams.

- With participation of external experts and consultants the feasibility study and funding model of the House of Technology has been prepared.
- The strategic model for operating the House of Technology has been prepared (including the organisational structure within the structure of the University and the congruence with university's strategic goals).
- A high level strategic outline of the commercialisation strategy (including the identification and protection of intellectual property rights) has been prepared

Results

The pilot strategy of the House of Technologies has already had an impact on various levels, starting from the very local level of the University. There the preparation of the concept has worked greatly to structure the various scientific ideas and initiatives. More than 150 different ideas were scrutinised, grouped and evaluated. Also, the project itself has stimulated the scientific personnel to shift their perspective and accommodate the view of commercialisation of their scientific work.

On the country level and the level of the region the pilot project of the House of Technologies has had a certain impetus on the process of technological commercialisation and has been received as a role model on how to stimulate the transfer of technologies.

In general, it is expected that the House of Technologies would have an impact on the following indicators:

- New channels of income from research services such as licencing of intellectual properties, increasing competitiveness of new project proposals, attracting new scientific personnel
- Improved technology transfer by increasing the technology readiness level of inventions
- Increased innovations and inventions with higher value added
- Improved quality and quantity of scientific publications

Future steps

The next steps in the process of the development of the pilot include:

- Attracting finance
- Finding the right legal framework (protection of intellectual rights, commercialisation)
- Building, procuring equipment
- Business plan implementation and control

Lithuania – Smart, Green and Integrated Transport in Smart Ports

Importance of the pilot for the region

In 2014 the Government of the Republic of Lithuania approved the Smart Specialization strategy programme in which Lithuania, like other European Union countries, has set its RDI priorities. This was done considering existing or potential competitive advantage. Priority directions for RDI were determined by analysing the potential of business and research in Lithuania, including human capital.

Klaipeda region has no separate Smart Specialisation strategy and it is a part of Lithuanian national strategy. The region needs to ensure that its interests are reflected in the national strategy, which provides a framework document for governmental investments.

Therefore, it was important to find the way how the engagement of maritime value chain (policy makers scientists and investors of the region), could help to shape Lithuania's Smart Specialisation strategy. In practice the aim is to reach a consensus on the industry transformation priorities and on channelling the resources for strategy implementation. In addition, the maritime industry is diversified, thus in order to lobby for regional priorities the local policy makers must reach a consensus about the selected regional priorities.

In the Initial Smart Specialisation strategy, the transport sector and the marine sector were not included as a separate priority. With consideration of the importance and potential of the sectors to Lithuania, and Klaipeda in particular, the Klaipeda Science and Technology Park (KSTP) and the Agency for Science, Innovation and Technology (MITA), decided to proceed with developing initiatives that might contribute to the development and visibility of these sectors with the help of Smart-up BSR project pilot activities.

By implementing the Smart-Up BSR activities partners agreed to concentrate efforts on including transport as a priority of the Smart Specialization Programme. In addition, the pilot ideas were guided the smart city mission, which serves the objective to promote cities to provide core infrastructure and give a decent quality of life to its citizens by a clean and sustainable environment and the application of 'Smart' Solutions.

This led to implementing the pilot "Smart Port" within the smart city theme. The strategic intent was to run a case to show how much potential there is in the sector, and how many goals Lithuania can achieve by investing and developing the smart transport sector.

Stakeholders also agreed to propose an additional priority in the updated version of the Programme on the Implementation of the Priority Areas of Research and (Socio-Cultural) Development and Innovation (Smart Specialization). This means extending the priority on transport to "Smart, Green and Integrated Transport".

The pilot's main task is to analyse the current situation of ports, their challenges, the technologies applied in the port and generate ideas, prototypes, solutions for port digitization and automation processes with the help of target groups.

Activities of the pilot project aim at creating a network of maritime innovators as well as developing unique solutions for maritime cities/regions that can be used not only in harbours and by companies who operate in ports, but also for universities to establish new pragmas, and for both Naval Forces and civil needs.

Strategic Intent

As digitization and automation are crucial in the development of maritime technologies, they have recently become a hot topic among companies and organizations in the global maritime supply chain. While the EU is still leading the maritime development globally, the challenge for regions like Klaipeda is to find the way to benefit on being frontrunners in the application of new technologies, gaining enough knowledge and capacity to transform local maritime industries to a higher added value products and services.

The challenge in the digitalization and automation of the Maritime industry is hidden in the scale. It was also important to have support and benefit from the legacy of different stakeholders who are involved in high-level discussions.

The active involvement of the Klaipeda Port authority in the process was promising, as this organization also is taking ownership of the challenge and seeks solutions. Companies, related to port industries, must grow from port cargo handling companies to innovative equipment producers, while shipyards need to step into the industry of autonomous shipping technology suppliers.

Klaipeda region brought forward the regional challenges in their effort to become a competitive and sustainable port and an important part of Lithuanian national economy. The challenges identified are:

- How to flexibly transform local maritime industries to be in tune with global digitization and automation trends?
- How to find the region's own niche and competitive advantage?
- How to reach stakeholder consensus locally and lobby at a national level?

Involvement and participation

Klaipeda Science and Technology Park (KSTP) and the Agency for Science, Innovation and Technology (MITA) promote business and science cooperation, commercialization of research and aim to stimulate applied research, technological development and innovation in Lithuania. KSTP and MITA, compiled a list of stakeholders that could be relevant in the process of Smart Specialisation planning and implementation.

In order to reach the targeted audience a wide network of BSR cross-regional partners were engaged. The invitations to the events were spread through BSR Port authorities and other interested parties. The wide interest in the pilot gathered a wide network of associated partners such as: JSC Klaipėdos Nafta (KN), Embassy of the Kingdom of the Netherlands in Lithuania, Lithuanian LNG cluster, Klaipeda State Seaport Authority, Lithuanian Naval Force, Ministry of National Defence, Enterprise Lithuania, Kaunas University of Technology, Klaipeda University, Vilnius Gediminas Technical University, Baltic Tech Park.

Smart Port pilot events were open for all who were interested in generating new ideas, have a solution on how to solve challenges, looking for new contacts and networks. We received registrations from various countries, not only from the BSR – this showed us that our set challenges are important also internationally.

The pilot events attracted participants from Poland, Sweden, Germany, Belgium, Norway, Denmark, Netherlands. There were representatives from Port authorities, Clusters, International companies, start-ups, new technology providers, students and scientists.

Representatives of international companies were attracted to participate in this pilot as experts and as mentors as well.

Pilot activities

Meetings with politicians, business and academia representatives were organised and SWOT analyses of Lithuania and the Klaipėda region were prepared. It was agreed that the main strengths of the region consist in the strategic location of Lithuania, the well-developed transport and logistic networks, as well as the advantages of Klaipeda Sea Port. Nevertheless, it was noticed that these strengths and potentials that might benefit the region, were not prioritized in the strategy documents.

To implement The Pilot activities Lithuanian partners organized meetings with regional stakeholders, cluster representatives, universities and other projects partners.

To achieve the goals set for the pilot various events were organised which created the conditions for and strengthened the cooperation between public and private sectors. New solutions in digitalization, automatization, and smart transport ecosystems and safety are very important for all BSR ports. So, Lithuanian partners agreed that the pilot for Smart city – Smart Port would consist of three different events:

LNG forum 2019

Event organized on 15-16 May, 2019 in Klaipėda, Lithuania.

Partners: Lithuanian LNG cluster, KSTP, JSC Klaipėdos Nafta (KN), Embassy of the Kingdom of the Netherlands in Lithuania.

Participants: Representatives from Poland, Sweden, Germany, Belgium, Norway, Denmark, the Netherlands and Lithuania. 200 participants, 8 countries, 26 speakers

Goal: to present and share experience about new, innovative technologies and services that are developed in BSR and provide a full overview of the LNG application and perspectives, ranging from LNG road and railway transport to the maritime and inland waterway sector. Sustainable LNG and liquefied biogas (LBG) infrastructure development.

Portathon Baltic 2019.

Event that gathered many parts of smart maritime innovation ecosystem and contributed to development of concrete solutions. Organised on 20-22 September, 2019, Klaipėda, Lithuania.

Partners: Lithuanian LNG cluster, Klaipėda Science and Technology Park (KSTP), Gdansk-Gdynia-Sopot Metropolitan Area, Agency for Science, Innovation and Technology (MITA), Klaipeda State Seaport Authority.

Participants: Representatives from Sweden, Germany, Netherlands and Lithuania. 80 participants, 4 countries, 12 mentors, 18 teams and solutions.

Goal: to generate ideas and prototypes that could be adapted in developing smart transport ecosystems and in the logistics sector through automation and

digitalization of port terminal facilities and various processes; to increase port efficiency and do impact for port environment regarding SDG.

Portathon Baltic 2020.

The hackathon "Portathon Baltic 2020" organised for the second time has brought together teams, companies, innovators and start-ups from Smart-Up Lithuanian and Polish partners. The hybrid event took take place on the 25th-27th of September 2020 and through the virtual platform it provided opportunity for a large international group of enthusiasts to participate.

Delta Navy – Military Tech Hackathon

Event engaging citizens and stakeholders of the locally based ecosystem to take active role in the development of new technologies, related to safety and security, Organised on 25-27 October, 2019 Klaipėda, Lithuania.

Partners: Lithuanian Naval Force; MITA, Ministry of National Defense, Enterprise Lithuania, Kaunas University of Technology, Klaipeda University, Vilnius Gediminas Technical University, Baltic Tech Park, Klaipeda Science and Technology Park.

Participants: 50 participants, 26 mentors, 11 teams and solutions. Considering the specific maritime smart city topic, Delta Navy Hackathon was held in a Lithuanian Naval Force headquarters and supply ship "Jotvingis". Due to the sensitivity of the field of potential new applications, Delta Navy Hackathon organizers had to organize the selection of potential participants in a two steps selection and preparation procedure to form teams and to acquaint selected participants with the tasks.

Goal: to generate ideas and prototypes that could be adapted in the Navy; to encourage the development of advanced products that require the highest military requirements; to bring people from different fields for the same purpose - to strengthen the Navy and development of solutions, that might be used for civil purposes of safety and security.

Discussions focused around many different notions, such as autonomous ships, fully automated ports, digitized shipping information and documentation, automatic monitoring of vessels and equipment, among other sectoral issues. This led to the identification of the main questions for a mini Innovation camp in Lithuania, Palanga:

- How can a smart city connect and support a smart region?

To do this work international experience and best practices were needed which could be accessed by interacting with Smart up BSR network partners.

The Mini-Camp started with a visit to Western Baltija Shipyard to get insights on maritime industry development at Klaipeda region. The working group on Klaipeda regional challenge outlined the importance of joining different key actors to promote and work with the maritime industry. By attracting a critical mass, the maritime industry would be considered in the national Smart Specialization strategy. The working group developed a roadmap for linking maritime industry to Smart Specialisation priority areas:

1. Finding key players;
2. Preparing pitches for industries connected with the maritime sector
3. Business cases
4. Clustering
5. Changing mindsets: e.g. by shock therapy – what if Lithuania had NO maritime industry?

This developed roadmap, based on the experience of participants and experts who attended the innovation camp, provided a start to implement pilot activities.

"Portathon Baltic 2019" (20-22 September, 2019) brought together professionals and technology enthusiasts of different competencies in the environment open to creativity in order to generate ideas and prototypes applicable in the logistics sector by automating and digitalizing port terminal equipment and various processes as well as developing smart transport ecosystems. The challenge was accepted by 80 participants from 4 countries – Lithuania, Netherlands, Sweden and Germany.

Delta Navy Hackathon (25-27 October 2019) was very successful, attracted more than 80 participants and created a list of very competitive solutions, that got attention from investors, who participated in the event.

With the involvement of main stakeholders of the maritime ecosystem, IT/engineering field experts, and qualified citizens, innovations were created to improve safety and living standard of the population by creating the following solutions:

- Personnel monitoring system,
- Laser communication,
- Search/environmental analysis drone.

The first price at Delta Navy Hackathon was assigned to the team „VGTU-AGAI2", that created unique solutions for laser-based communication system, These solutions are highly applicable for the use of safety and security in port areas, for example for communication between the ships where radio connection is not possible. Involvement of scientists and specialists from different fields in the creation of new products for smart ports is crucial for proving the efficient functioning of innovation ecosystem.

Results

After scanning existing initiatives and ideas for projects with the intention to create synergy and larger regional impact as well as with the aim to identify the steps for achieving bigger impact in the BSR region, the goals for the Smart City – Smart Port pilot project were set to:

- generate prototypes that could be adapted in developing smart transport ecosystems and in the logistics sector through automation and digitalization of port terminal facilities, safety and various processes
- increase port efficiency
- impact the port environment regarding SDG;
- promote autonomous port vision by increasing digitalization and automation processes in Klaipeda port and among all port terminals, stakeholders and companies in BSR;

- encourage the creation of teams of innovators interested in the newest technologies for port safety and applications in Naval Forces.

Implementation of pilot projects, stakeholder engagement and diverse operational activities in the region were the key factors in moving the Smart Specialization approach to the centre of the regional transformation processes.

As active engagement of target groups and ecosystem stakeholders in the activities organized is also essential for the success of implementing Smart Specialization policies, the pilot consists a valuable example in practice. Numbers of participants in the events shows motivation and commitment, that are also key facets of the mindset, needed to elaborate future transformation processes. However, more efforts are still needed in terms of creating a cross-regional critical mass.

The Smart City – Smart Port Pilot was useful for Klaipeda Sea Port authority and Klaipeda region. By implementing the Pilot, all parties – science, business and municipality could exchange their vision of smart port. Klaipeda Port authority identified their advantages and weaknesses comparing with other BSR ports. Klaipeda region accepted the main goal of the Port to become autonomous port.

Pilot activities facilitated increase of certain knowledge among KSTP and MITA. Representatives from MITA gained very interesting knowledge and experiences how to co-organize and take active part (as mentors and experts) in hackathons, encourage building of quite unique innovation ecosystem in quite closed and specific navy sector, evaluating possibilities to adopt new solutions, proposed by the winners of Delta Navy Hackathon to Port and Smart City areas.

Another result is the increased awareness of regional representatives from private and public sectors as well as citizens, about what it means to be the part of a place-based innovation ecosystem and Smart Specialization process. This improved the understanding of the benefits of actual participation and raised the level of motivation for taking active and constructive steps in the processes.

Pilot activities provided also very practical experience and skills on how to organize events, engage different stakeholders, find various challenge angles that would motivate participants to take active role in the processes.

In addition, pilot projects enhanced commitment, helped to build new skills and competencies for organizers and co-organizers of events - KSTP and MITA. Their role as key player uniting stakeholders of maritime sector in the region was established. Both institutions gained competencies in many different areas: use of new innovative tools and ecosystem thinking, encouragement of the emerging place-based ecosystem, transnational cooperation and open innovation processes, mindset of experimentation and change management instruments to assure the transfer of best practices into activities implemented.

The process of pilot projects implementation brought several important achievements:

An updated version of the Programme on the Implementation of the Priority Areas of Research and (Socio-Cultural) Development and Innovation (Smart Specialization) and their Priorities was approved on July 24, 2019 by the Resolution of the Government of the

Republic of Lithuania No 760. This was possible thanks to the efforts of stakeholders and key players. Being able to show the potential of smart and integrated transport activities led to including the separate priority for Smart, Green and Integrated Transport in the updated version of the Programme.

Pilot activities also increased the awareness of regional representatives from the private and public sectors, as well as of citizens, about what does it mean to be the part of place-based innovation ecosystem and Smart Specialization process. Also, their understanding of the benefits of actual participation improved, which raised the level of motivation in taking active and constructive steps in the processes.

Organizing Hackathons as a form of implementing cooperation became a popular and effective way to bring all interested parties in one place to find needed solutions. Partners in Lithuania wanted to apply this form of events (hackathon) for the Smart city sector with the focus on the development of solutions, prototypes related to autonomous port, digitalization and automation processes, safety and living standards of the population in the Port area.

Pilot projects enhanced commitment, helped to build new skills and competencies for organizers and co-organizers of events -KSTP and MITA. Both institutions gained competencies in many different areas: use of new innovative tools (Hackathons) and ecosystem thinking for encouragement of emerging place-based ecosystem, transnational cooperation and open innovation processes, mindset of experimentation and change management instruments to assure the transfer of best practices into activities implemented. Project pilot activities also helped KSTP to increase their role as key player, uniting stakeholders of maritime sector in the region.

Impact for BSR region: Activities of the Pilot project helped to create a network of maritime innovators as well as to develop unique solutions for maritime cities/regions. This directly related to the implementation of Smart Specialisation in the region. The emergence of new solutions for autonomous ports, safety, and security, strengthens the competitiveness of the BSR region and contributes to the collaboration of harbour cities in the whole BSR.

The Smart-Up BSR project created an active network of experts from three Baltic ports: Klaipeda, Kotka and Gdansk-Sopot-Gdynia, who shared their knowledge and insights about possible solutions to existing challenges, ways to encourage the emergence of innovative ecosystems in the ports. Active cooperation between Smart-Up BSR project partners, openness and sharing of knowledge about innovative solutions, elaborated in the pilot actions, might be implemented internationally and could lead to the development of Smart ports network in whole Baltic See region.

Future Steps

All pilot projects were good examples that helped to test the existing innovation ecosystem: by testing networks and cooperation between different stakeholders, the response of science and business people, the legal framework as well as potential financing instruments to be offered to the teams in all stages of product development.

The competencies acquired will guide future action. The main lessons learned from the piloting actions emphasise:

- the need for more focus on experimental development and innovation;
- closer and consistent networking with mentors and experts;
- the improvement of financial motivation systems for RDI activities and for attracting of professional mentors/ experts to work with the teams.

The pilot showed that currently working at international level is still challenging for many innovative companies. In the future they need to be prepared to take advantage of emerging opportunities.

It was very useful to hear different opinions from large international companies about experiences gained during participation in pilot activities. But at the same time some companies reflected about the reasons to refuse participation in the events. Future activities need to resolve the fact that there is still a lot of fear to share own ideas and to participate in the brainstorming and creation of new prototypes.

The wide range of solutions provided by the pilot teams includes> autonomous electric ferry, mobile application for the management of truck terminal, underwater drones, an inland container barges reservation system, a joint service and resource acquisition system, a mathematical model for more efficient organization of work in ports, a technical solution for dust removal when handling bulk cargoes, and a robot for measuring and analysing potential pollution.

All these solutions elaborated during hackathons have potential to become internationally attractive products, that might be applied in other Ports of Baltic See and so to contribute to more environmentally friendly, safe and innovative BSR.

Now actors of the Klaipeda region innovation ecosystem must take advantage of the achievements of the pilot projects and its events and activities. Based on the addition of the “Smart, Green and Integrated Transport Priority” that occurred in the national strategic documents Klaipeda can take initiative to boost the sector and make Klaipeda a frontrunner of smart ports.

Poland – Cross-regional Hackathon for Smart Port

Due to Covid 19 the pilot could not take place before the time of writing this report.

The hackathon "Portathon Baltic 2020" organised for the second time has brought together teams, companies, innovators and start-ups from Smart-Up Lithuanian and Polish partners. The hybrid event took take place on the 25th-27th of September 2020 and through the virtual platform it provided opportunity for a large international group of enthusiasts to participate. A brief video produced immediately after the event in collaboration with the Lithuanian partners summarized the highlights.
https://www.youtube.com/watch?v=PUh6IabRVvU&feature=youtu.be&fbclid=IwAR28JZHXq_bvCuEGDH3mZFrNvw0K1EAyVxqcoKCrRqLnzAM3C1IZPSmBhl8

Importance of the pilot for the region

The Gdansk-Gdynia-Sopot metropolis is the largest urban agglomeration on the Baltic Sea in Poland. There are two large seaports - one is located in Gdynia and the other in Gdańsk. The development of seaports undoubtedly contributed to the development of both cities. Maritime economy is one of the key industries in the Pomorskie region. Maritime and logistics is also one of the Pomorskie Smart Specializations.

During one of the Innovation Camps, we came to a common conclusion with Klaipeda that we could try to organize two Hackathons on the smart-port theme. One was organized in Klaipeda in September 2019. In Gdansk the Hackathon was planned for June 2020, but due to the COVID 19 situation the event was cancelled. Finally, in July 2020, the Lithuanian team proposed to organize a joint Hackathon, called Portathon Baltic 2020.

Involvement and participation

The event will be physically located in Klaipeda, but due to the COVID/19 situation, it will also be possible to access the event via an on-line platform, which significantly opens this event to participants from outside Poland or Lithuania.

From Gdansk it will be a fully on-line option for the mentors and participants. Registration for the Portathon is open to all the BSR partners. Partners of the event are two seaports (the Port of Klaipeda and the Port of Gdynia). Portathon is an event dedicated to companies, individual start-ups, specialists, engineering students and IT students. Ports, port companies and other organisations are invited to offer their challenges to the organisers which will determine the solutions invented and developed by the participants.

Pilot activities

As a metropolitan association of the Gdansk-Gdynia-Sopot metropolis we engaged the Gdansk Business Incubator as a coordinator of the Gdansk part of the event. Gdansk Business Incubator is responsible for the Pomorskie Smart Specialization in the subject of

maritime and logistics, as well as cooperating for a long time in the ecosystem of start-ups and entrepreneurship development in our metropolis.

Cross-regional activities are regular. Together with the Klaipeda Technology Park (KMTP) and MITA, we meet recurrently on an on-line formula to organize the next steps bringing us closer to the event.

Results

Organizing the event at an international level, as well as facing the new challenge, which is to organize a fully online Hackathon, will certainly result in acquiring new competences. Having been able to organise such a unique event and cross-regional collaboration completely on-line and virtually, this will give the team and the co-operating stakeholders the skills and competence to make use of virtual collaboration possibilities in the future.

Summary and future steps

The joint organization of the Hackathon is a port subject which is important for the entire BSR. It will be a great culmination of several years of working on the Smart-up BSR project via Innovation Camps and building the Baltic Sea Region innovation ecosystem. Most importantly, the lessons and skills learned as well as the cross-regional contacts will carry on into new future activities.

Russia - St. Petersburg Smart City

Importance of the pilot for the region

The main priorities in developing a smart city in St. Petersburg

In St. Petersburg the smart city "construction" began at the end of 2016, although some elements, such as a safe city, a single document centre, etc. were developed much earlier[6]. The project was officially launched in 2017, when the city administration entered into an agreement with ITMO University (science and citizens) to jointly create the development concept within the framework of the "smart city" paradigm. Together they have launched the Smart Saint-Petersburg Project Office inviting entrepreneurs from different areas and scales of business spheres to solve the problems of a smart city in an open discussion. The final Concept of Smart St. Petersburg was approved by the former city governor Georgy Poltavchenko in April 2017. The Smart Saint-Petersburg Draft Priority Program by Project Office based on the concept still remains at a draft stage[7].

The Smart Saint-Petersburg concept sets the main goal of "smart city" as ensuring the high perceived quality of urban life. According to the authors of the concept, the "smart city" paradigm embraces the idea of saving resources, creating high-quality urban environments and ensuring a high quality of life for the population through effective management of urban processes in combination with the open interaction of all stakeholders (citizens, business, government, and others) (Mityagin et al., 2019, pp. 18-19)[8].

The Smart Saint-Petersburg follows six key principles.

1. The principle of creating a comfortable urban environment for everyone. This principle suggests that the urban environment will provide the needs and expectations of all population groups. Defines a universal method for assessing the quality of the urban environment as the ability of a city to satisfy the objective and subjective expectations of a city dweller.

2. The principle of coordination and interaction of all participants in the development of the city. This principle suggests the need to attract all categories of stakeholders in the process of creating and using a "smart city".

3. The principle of the additional purpose of urban infrastructure. This principle implies the priority of endowing existing elements of the urban infrastructure with new functions and thereby obtaining new results.

4. The principle of sustainable development based on monitoring, analysis and forecasting. This principle involves a comprehensive digital description of the city as a holistic system

[6] https://www.gov.spb.ru/press/governor/110988/

[7] https://www.gov.spb.ru/press/governor/138307/

[8] Mityagin, S., Karsakov, A., Bukhanovsky, A., Vasiliev, V. (2019) Smart St. Petersburg: an integrated approach to the implementation of information technologies for megalopolis management // Control Engineering Россия. 79 (1). *(In Russian)*. Accessed at: https://controlengrussia.com/otraslevye-resheniya/zhkh/umnyj-sankt-peterburg/

and monitoring of its condition for solving the problems of assessing, analysing and forecasting the city development.

5. The principle of creating a digital environment for self-organization of residents and businesses. This principle involves the creation of a holistic information space of the city for the population and business and the opening of city data.

6. The principle of "Smart City" is a city where happy people live. This principle suggests a priority orientation on creating positive motivations of residents from interacting with the urban environment[9].

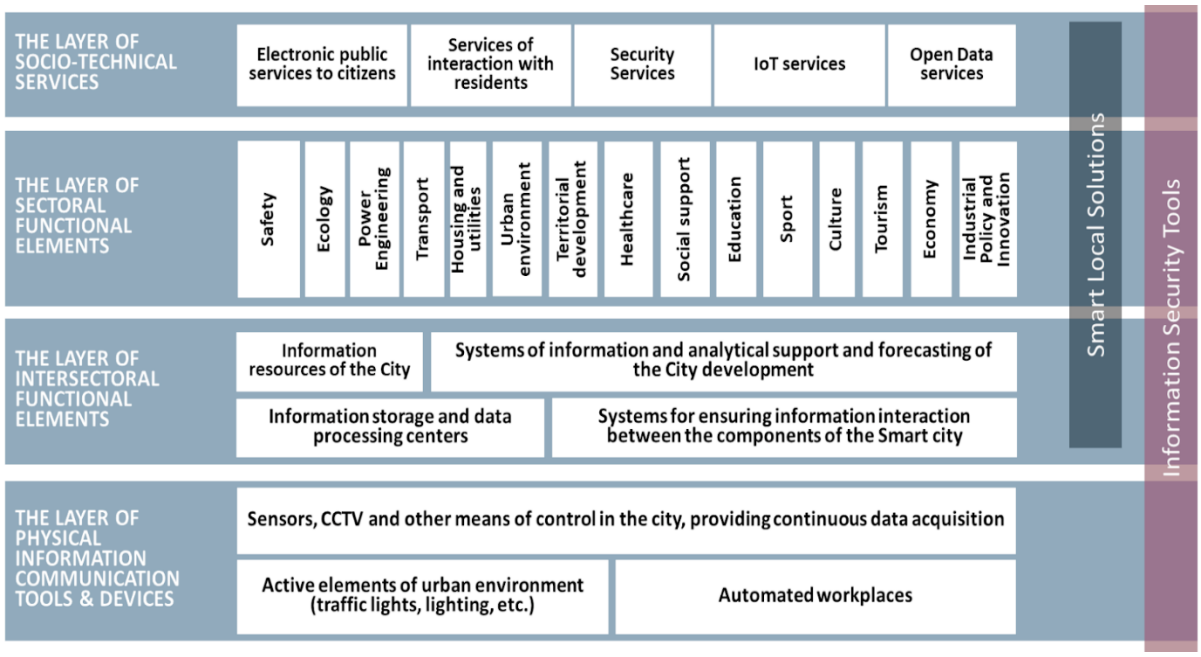


Figure 4 The structure of the interacting elements of smart city ecosystem

The notion of "smart city" in Russia at local, regional and federal levels

It should be considered that at the federal, regional and city levels in Russia there are various approaches to the definition of the concept of "smart city", and these definitions differ among representatives of government agencies and businesses.

At the federal level, the Digital Economy Standard has been adopted, where the concept of "smart city" is defined as improving the quality of city management and the standard of living in cities through the introduction of advanced digital and engineering solutions.

In 2018 the Ministry of Construction of the Russian Federation launched the departmental project on digitization of the urban household entitled "Smart City". The project is part of the national Housing and Urban Environment project and the Digital Economy national program and is financed from them[10]. The federal "Smart City" project is aimed at increasing

[9] Ibid.

[10] Order of the Ministry of Construction of Russian Federation Order No. 695/pr d. 2018-10-31 "On approving the passport of the departmental urbanization digitization project "Smart city". Accessed at:

the competitiveness of Russian cities, creating an effective urban management system, creating safe and comfortable living conditions for citizens[11]. It is based on 5 key principles:

- human orientation;
- urban infrastructure manufacturability;
- improving the quality of urban resource management;
- comfortable and safe environment;
- focus on economic efficiency, including the service component of the urban environment.

The main tool for implementing these principles is the widespread adoption of advanced digital and engineering solutions in urban and municipal infrastructure. The Smart City goal is not only to digitally transform and automate processes, but also to comprehensively improve the efficiency of urban infrastructure.

Some elements of smart cities appeared in Russia much earlier since the mid-2000s. Therefore, the national project "Smart City" is not being created from scratch. At least four cities - Moscow[12], St. Petersburg, Kazan[13] and Tyumen[14] - began their smart city projects long before the advent of the all-Russian concept. As will be shown below, these cities rate the highest in the Cities' IQ Index.

To run the national "Smart City" project and to evaluate the situation with the present "smartness" of Russian cities the Ministry of Construction has launched a new national index - Cities' IQ. The index evaluates 10 areas of the city ecosystem (urban management, smart utilities, urban environment innovations, smart transport, intelligent systems of public and environmental safety, tourism and service, intelligent social services, economic status and investment climate, communications network infrastructure) and contains 47 indicators in total. In 2018 the index has been applied to 191 cities with a population over 100 thousand people (administrative regional centres) and pilot cities with population less than 100 thousand people which participated in the project on their own initiative. These numbers were taken as a baseline for the year of 2019 to measure effectiveness of the smart solutions implemented by Russian cities under the "Smart City" project. An important indicator of effectiveness is not the meaning of the index itself, but its dynamics through years.

The index methodology divides all of the cities into 4 groups by population: 15 largest cities over 1 million citizens, 63 large cities from 250 thousands up to 1 million citizens, 93 big

https://russiasmartcity.ru/uploads/attachments/c6eff680-08dc-4d26-8323-40c5629f14fb/bfe3821963d69e26c6b6276d5abb6498.pdf.

[11] https://russiasmartcity.ru/about.

[12] https://www.smartmsk.com/aboutus

[13] https://rt.rbc.ru/tatarstan/18/12/2018/5c17a40e9a794747cee87c1e

[14] https://smartcity.tyuiu.ru/?page_id=2

cities from 100 to 150 thousand citizens and 20 moderate cities with population less than 100 thousand people. Other cities are pilot cities - administrative centres and others, 84 in total. The index for each city is calculated as a sum of ten indicators (sub indexes). When rationing, a scale of 1 to 12 was applied[15]. The first three cities in each group are:

I. The largest cities:	II. The large cities:	III. The big cities:	IV.Administrative centers and pilots:
Moscow – 81,19	Khimki – 66,32 2.	Reutov – 71,35	Dubna – 72,48
Kazan' – 52, 58	Balashikha – 59,38	Serpukhov – 63,5	Ivanteevka – 62,18
St. Petersburg – 50, 37	Tyumen – 58,31	Electrostal – 61,88	Naro-Fominsk – 41,02

Table 1 Russian cities IQ index

The position of St. Petersburg in smart city field in Russia

Thanks to vigorous activity both in the implementation of smart city projects and the development of an integrated approach for the development of the city, St. Petersburg always scores high positions in development ratings in Russia and often falls into world ratings.

In the Cities' IQ Index St. Petersburg takes the third place having lost the championship only to the Moscow capital and Kazan, where the smart city agenda is several years older[16].

Another relevant index of sustainable cities was presented by SGM Agency and scoped 185 cities with a population over 100 thousand people. The positions of cities in the ranking are based on 42 indicators measuring three main areas of sustainable development: economic, environmental and social (including demographic). St. Petersburg took 2nd place among Russian cities with a population over one million people and 3rd place in the overall ranking, losing Tyumen to silver[17].

Inclusion of St. Petersburg into international ratings is occasional, while the latter usually include capitals or first leading cities of the countries (for example, New York in the USA, which is not the capital). In Russia, both of these places are occupied by Moscow, which gets into the rankings quite regularly. However, St. Petersburg appears in more complex ratings. One of these is the international rating "IESE Cities in Motion" based on public polls (though the samples are relatively small)[18]. It contains nine criteria - human capital (development, attraction and talents upbringing), social cohesion (consensus between different social

[15] The description of the "Cities' IQ" index is accessed at: https://www.minstroyrf.ru/press/minstroy-rossii-predstavil-pervyy-indeks-iq-gorodov-/

[16] http://d-russia.ru/wp-content/uploads/2020/03/prezentatsiya.-indeks-iq-gorodov.pdf

[17] http://agencysgm.com/projects/%D0%91%D1%80%D0%BE%D1%88%D1%8E%D1%80%D0%B02017.pdf

[18] https://media.iese.edu/research/pdfs/ST-0509-E.pdf

groups of the population), economy, environment, management, urban planning, international relations, technology, mobility and transport (ease of movement). In total, 174 cities from 80 countries were rated in 2019 and St. Petersburg took 121st place (next to Istanbul and Doha) in the overall ranking and scored quite high in human capital (39th place) and urban planning (52nd place).

Another rating, also based on the public polls, was developed by the IMD World Competitiveness Center in conjunction with Singapore University of Technology and Design[19]. This index measures public perception of smart technologies progress and draws on the idea that smart city technologies are crucial for attracting investments and urban development. St. Petersburg took 73rd place; citizens particularly appreciated its cultural events, job search services, and public transportation.

Involvement and Participation

According to the Smart Saint-Petersburg Concept elaborated by the Project Office and approved by the city of St. Petersburg administration, the relationship between the different stakeholders and their motivation for involvement is outlined. These are citizens of all age groups, urban communities, public authorities and business organizations and NGOs. The main interested party are the citizens, whose needs should be met in order to establish better quality of urban life.

The main stakeholders of the federal “Smart City” project besides the Ministry of Construction are the Ministry of Telecommunications, Digital Development and Mass Communications, companies-monopolists PJSC Rostelecom, governmental corporations Rosatom and Rostekh, and a newly established National Competence Center for Smart City (NCCSC). The working group of the project is a bit wider in terms of spheres represented and includes around 30 people - representatives of companies working in IT, mobile communications, energy and natural resources consumption, representatives of bodies of executive power and a minor share - people representing science (namely two university rectors).[20] NCCSC is responsible for the development, implementation and popularization of technologies, equipment, programs aimed at increasing the digitalization of the urban economy, and also the preparation and provision of assistance to international cooperation projects on housing policy, urban development and natural resources management, primarily related to the creation and functioning of “smart cities”.[21] NCCSC has elaborated

[19] https://www.imd.org/smart-city-observatory/smart-city-index/.

[20] Order of the Ministry of Construction of Russian Federation, January 17, 2019 No. 18/pr "On the creation of a working group of the Ministry of Construction and Housing and Communal Services of the Russian Federation on the launch and implementation of the departmental project for Digitalization of Urban Economy" Smart City ". Accessed at: https://russiasmartcity.ru/uploads/attachments/60e4fc76-9ae2-4c75-aaba-258966910e77/dfd44325fe5753c979c1f1debc31085d.pdf

[21] https://www.minstroyrf.ru/trades/gorodskaya-sreda/proekt-tsifrovizatsii-gorodskogo-khozyaystva-umnyy-gorod/.

the draft Smart City Standard[22] and runs a bank of “smart solutions” on the project website https://russiasmartcity.ru. Today this bank presents 537 cities, 364 projects, and 18 experts.

Smart St. Petersburg Project Office

Smart Saint-Petersburg Project Office was launched as a cross-sectoral working group to run the dialogue between different stakeholders on the implementation of smart city in St. Petersburg. The first meetings started in August 2017. The Project Office was legitimized by the special order of the city governor (now former) Georgiy Poltavchenko. From the beginning Project Office (PO) has been a meeting point of different sectors - governmental bodies, business and science & education (universities). The sphere of NGO and civil society was underrepresented, however their representatives were planned to include further, after first processes and mechanisms of work were settled. One of the main features of the Project Office gathering was a key role played by the university sector, namely ITMO University (one of the leading IT and technical universities in Russia). ITMO University rector Vladimir Valiyev was appointed as a scientific curator of the Project Office, while the head of the office was the city governor himself. The PO aimed at public discussion of the concept, financial mechanisms and the priorities for smart city development in the city and for the direct cross-sectoral decisions made “at the round table”. Since August 2017 the PO has been meeting twice a month, however with the re-elections of the city governor in spring of 2019 the process has stopped for a year; in spring 2020 the first gathering was planned after a long period but was stopped by coronavirus COVID-19. The continuation of the PO activity as for now is planned for August 2020.

Eventually a functional scheme of several working groups was organized inside of the Project Office:

1. workgroup on Smart St. Petersburg concept design, led by ITMO university experts in smart city;
2. workgroup on creation legal & organizational conditions, led by the Committee for informatization and communication of St. Petersburg administration;
3. workgroup on methodological support, led by ITMO university experts in technology;
4. workgroup on PR, led by Saint-Petersburg Diary media;
5. expert and technological council led by Tranzas technological business company.

The structure of the Smart City program and the mechanism of its implementation are the core of the Project Office activities.

Overcoming barriers

There are possible barriers that impede the development of “smart city” in St. Petersburg, confirmed by international studies and discussed at the meetings of the Project Office

[22] https://www.minstroyrf.ru/docs/17709/

members and with other similar smart city offices of international partners in Finland and Germany.

1. Slowness of city authorities. Russia as a country and St. Petersburg as a city are conservative. This is manifested at various levels, from preserving family traditions to emerging problems in changing existing management style and habits. In a rapidly changing world such rigid structures can rarely respond quickly to challenges.
2. Hesitation of citizens. People are not always ready for change. Those projects are easily implemented, which make life easier, for example, a new tram line or a single centre for receiving documents. Citizens are very careful on any projects in the historical centre, and smart technologies do not always carefully approach the cultural heritage.
3. Peculiarities of Russian legislation. There is a rather complicated system for obtaining a primary permit for new infrastructure projects. However, after the first stage of approval, the received documents simplify coordination with various authorities.
4. Different goals among stakeholders. As studies conducted by ITMO University showed, the authorities are more interested in security systems, business is interested in profitability, and citizens are more interested in a beautiful and green city.

With the exception of the peculiarities of Russian legislation the afore mentioned obstacles are present on several occasions when cities set out to implement Smart City developments and face difficulties to agree upon the goals of the city / region's transformation.

Pilot Activities

The selection of smart projects for the future implementation under the Priority Program is a 4-stage process:

1. Technical Assessment. Automatic bots check the compliance of the application by formal parameters.

2. Expert Assessment. Applications were reviewed by independent experts approved by the Project Office. Each application was tested by a minimum of three experts, anonymous to the author of the application.

3. Design Assessment. Applications selected by experts were approved by the project office. At this stage, the number of applications at the time of the formation of the Priority Program was 91.

4. Priority Assessment. The specialized committees of the project office with representatives of the authorities selected 62 projects that should be implemented in full or in pilot format for 5 years (i.e., until 2023).

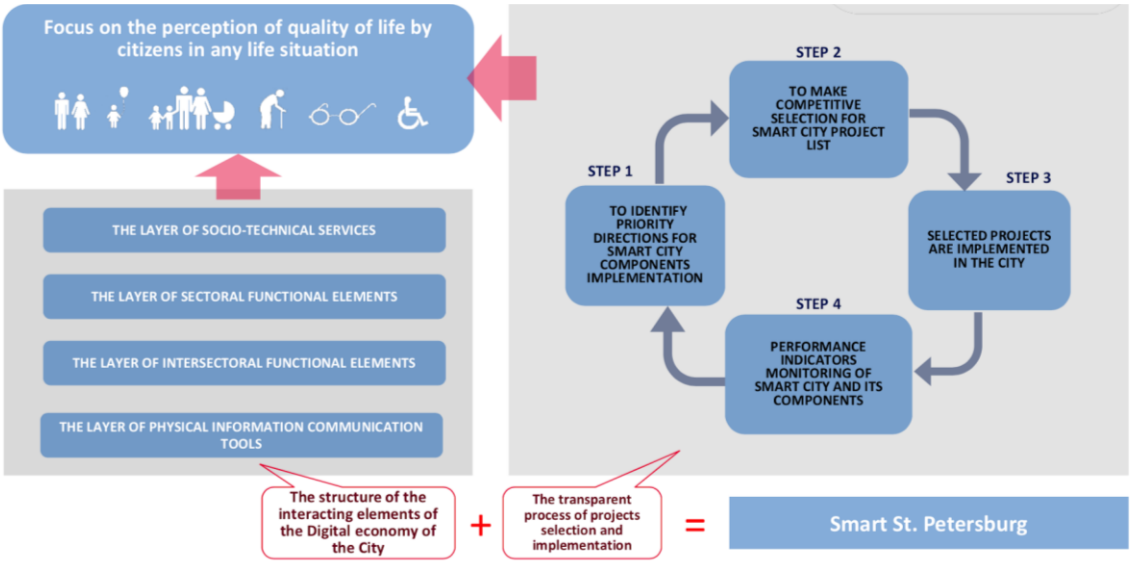


Figure 5 The layers of the "smart city" system and the process of implementation

www.petersburgsmartcity.ru is the beta version of the portal developed by the Project Office for collecting the ideas. The structure of the Bank of ideas is different from the structure of the Ministry for Construction National Project. It includes functional areas which correspond to the functional division between the committees inside the city administration.

URBAN ENVIRONMENT	**HOUSING AND UTILITIES**	**POWER ENGINEERING**	**ECOLOGY**	**CITY MANAGEMENT**
14 projects	9 projects	9 projects	4 projects	6 projects
HEALTHCARE	**TRANSPORT**	**DWELLING**	**SECURITY**	**EDUCATION**
8 projects	7 projects	2 projects	5 projects	1 project

Figure 6 Project proposals for the Smart City Priority Program in St. Petersburg

In 2019, a program financing scheme for the smart projects was developed and approved, in which project financing is based primarily on grants. In 2020, the implementation of the program was suspended due to the pandemic situation, when all fixed assets and forces were transferred to fight the virus. Planned resumption of work on the project: August 2020[23].

[23]https://ptelectronics.ru/stati/%D1%83%D0%BC%D0%BD%D1%8B%D0%B9-%D1%81%D0%B0%D0%BD%D0%BA%D1%82-%D0%BF%D0%B5%D1%82%D0%B5%D1%80%D0%B1%D1%83%D1%80%D0%B3-%D0%BA%D0%BE%D0%BC%D0%BF%D0%BB%D0%B5%D0%BA%D1%81%D0%BD%D1%8B%D0%B9-%D0%BF/

In parallel with the development of the Priority Program, the city actively supported initiatives and pilots falling into the category of smart city and not requiring active intervention. Thus, projects were implemented to cover the city with a 5G WLAN network, new bicycle lanes, “citizen card” and pilot “smart bus stops”, smart lighting and others[24].

Results

Despite the fact that Smart Saint-Petersburg is a young project, there already are successful smart projects in St. Petersburg. They concern e-participation and e-governance, smart transportation and smart lightning. Here we are illustrating some of them.

"Public services" Portal

Portal “State and municipal services (functions) in St. Petersburg” (Portal) - a single access point to information and reference resources on the procedure for obtaining state and municipal services in St. Petersburg, as well as to the interactive section, which contains electronic application forms on the provision of services with the possibility of filling and submitting them online[25]. Currently, more than 150 electronic services are provided through the Portal, additional services for making payments and paying state fees in electronic form are implemented. It is also possible to track the status of the application for the provision of services submitted earlier both through the Portal and at the multi-functional center (governmental subordinate organization providing public and administrative services in the city).

The authorized users of the Portal can access the Personal Account, where all user information is stored in a protected form. The user can fill out data about himself, his children, add information about his vehicle, so that later this information simplifies and speeds up the process of submitting electronic applications or making electronic payments. In your Personal Account you can view information on accrued fines and make payments on them.

Since the transition to the provision of public services in electronic form requires the provision of secure online identification for applicants, you can use the full range of services and services on the Portal only after registration. Registration on the Portal is based on the Unified Identification and Authentication System (ESIA). Registration in the ESIA is associated with the verification of criteria that are significant for an identity card, thus, the ESIA ensures the protection of the information contained in it in accordance with the legislation of the Russian Federation.

“Our Petersburg” Portal

[24]http://tdaily.ru/news/2015/03/26/megafon-nastroil-lte-v-peterburge;. https://regnum.ru/news/2797610.html

[25] https://www.gov.spb.ru/gosuslugi/

The portal was created on the initiative of the Governor of St. Petersburg with the aim of increasing the effectiveness of the dialogue between citizens and authorities, as well as improving the quality of life[26]. On the portal a registered user can:

1. send messages about problems associated with housing and communal services and city improvement, the condition of roads and sidewalks, illegal objects of construction and trade, violation of land or migration laws;
2. inform city services about the lack of reference information on information stands, as well as unsatisfactory sanitary condition of the premises in budgetary institutions operating in the fields of education, health, culture, social protection of the population, and employment;
3. get additional information regarding special city programs, managing organizations, as well as background information on objects of interest;
4. get acquainted with the technical and economic passports of apartment buildings in St. Petersburg and get information about the organizations serving them;
5. receive information on the progress of consideration and development of messages sent by user;
6. evaluate the response received.

Messages sent through "Our Petersburg" portal are mandatory for city services to consider in a strictly defined time frame. The portal is constantly being improved and expanded.

Commercial tram "Chizhik"

St. Petersburg has long been considered the world capital of trams; the largest number of tram tracks were laid here[27]. However, in recent years there has been a tendency to reduce tram tracks and transfer lanes for conventional vehicles. At the same time, passenger flows are redistributed between buses, trolleybuses and the subway. One of the most successful projects in the field of transport now looks all the more curious: several years ago, the first commercial route "Chizhik" was launched. Unlike other modes of transport, which are serviced by enterprises with large shares of the city or state capital, this project is absolutely commercial.

Modern, high-tech rolling stocks of the Swiss company Stadler make a 3-section single space of the tram and ensure even distribution of passengers. The salon is quite spacious, with capacity up to 370 passengers. The structure is two-sided - with two control cabins and symmetrically located doors on both sides. The wagons have a completely lowered floor, which ensures ease of boarding and exit, as well as the availability of this type of transport for people with limited mobility. The salons are equipped with modern air conditioning and heating systems. Strollers are available. Inside each car there are information boards and speakers that inform about the route and the next stops.

[26] https://gorod.gov.spb.ru/about/

[27] http://chizhik-lrt.ru/

New tram tracks have been created using modern technologies for noise insulation and vibration reduction of the rail track. Tram tracks go along a selected section of the road. A special dispatching system assumes a calling phase, providing a "green" corridor, thereby providing a priority for the tram when crossing intersections. These “smart” trams, moving on a separate canvas with a high average speed, are an effective form of urban public transport and are second only to the underground in terms of carrying capacity.

The tram payment system is fully integrated with the citywide system. In "Chizhik" all kinds of documents giving the right for privileged travel are accepted. The fare is based on urban public transport tariffs. Finally introduced in the 3rd quarter of 2019, Chizhik operates in one district of the city and has plans for two more.

Future Steps

Smart Saint-Petersburg Project future is connected with two key domains: development of the Concept and the Priority Program.

As the city moves one and introduces new smart technologies, the concept should be reviewed and adjusted. In addition, its new versions should take into account new challenges of the time that could not be provided for in previous versions. An appropriate example is the coronavirus COVID-19 outbreak. Smart health was represented in the concept from the very beginning, however this block requires adjustment based on the consequences of the new challenge.

The Priority program can also be adjusted for the same reasons, however, it should not undergo drastic changes. Among the medium-term projects to be implemented in St. Petersburg in the next 2-3 years, the following can be noted:

- Creating an ecosystem of services for a city dweller. The project is implemented jointly by the Committee on Informatization and Communications and ITMO University. It is planned to streamline existing and develop new services for the city dweller associated with all the basic blocks of life. The presentation was supposed to take place in April 2020, but was postponed for known reasons.
- Systems of automated control of public safety. First of all, transport, courtyards and residential complexes. The system itself has already been implemented in almost the entire city; systems identify a person by her digital footprint (cameras, mobile data, payment data from bank cards, etc.) in automatic mode.
- Unified integration platform for housing and communal services. Data from numerous sensors, including those installed in apartments and highways, should more efficiently allocate resources and respond quickly to emergency situations.
- Smart library. Implementation of a project for access to electronic library collections with a single-entry point.
- Unified electronic medical record (the project is integrated with a similar all-Russian project).
- Monitoring system for cancer patients, the elderly and people requiring an inclusive approach.

- Unified urban data platform. Most of the city data, except for those of strategic importance, is planned for opening for use by citizens and business.

The main long-term project at the moment is the City's Digital Twin - development of a situational analysis system based on automatically collected data. A large number of a wide variety of sensors have already been installed in the city, and the system of processing information from them and automatically making decisions is improved annually. It is assumed that in the future, all analysis systems will have to merge into one and make decisions not only on the basis of their own sensors, but also information from other analysis systems.

4. Conclusion

By looking at the learnings from regions in the BSR macro-region we can conclude that it is not fruitful to search for a one-fit-all formula to answer the guiding questions. Therefore, a region that can be considered as having the competencies to successfully plan, prepare, execute and implement Smart Specialisation priorities through thematic pilots is a region that is committed to assess its practices and implementation processes.

The combination of the various types of knowledge becomes evident through the entrepreneurial actions and vivid activities of learning by interaction. By analysing regional pilots for strategy implementation, we have an assessment of evidence-based strategy implementation. This exemplifies what Asheim, Isaksen and Trippl (2019) call DUI (doing – using – interacting).

Therefore, what we learned from analysing the pilot process is that transformation can only be reached by getting started: starting from sharing knowledge, continuing to learning from each other, exploring while doing, then reflecting together on the results of stepping forward, and through these interactions moving forward with revising action.

The experiences and conclusions presented in this report create the basis for the book *Baltic Sea Regional – Strategic Instruments for Sustainable and Entrepreneurial Capacity Building*[28] published as a result of the Smart-Up BSR project activities. The book is beneficial for increasing awareness among regional stakeholders of what is needed in terms of capacity building in order to utilize regional and cross-regional resources in a way to create balance.

[28] Tukiainen and Hongisto (2020), *Baltic Sea Regional – Strategic Instruments for Sustainable and Entrepreneurial Capacity Building*

ANNEX I – Template for pilot reports

A. IMPORTANCE OF THE PILOT (based on 6 phases of systematically integrating IC in pilots)

1. Needs and Potentials Identified

- explain why your region selected a certain spearhead in the Smart Up project,
- what potential does it have for your region and who will benefit

Consider the RIE and RIS3 specific needs that you have worked on from different viewpoints in order to identify regional, national and EU/global potential.

2. Strategic Intent Formulated

- i.e. describe the use of SWOT exercise in your region
- analysis of the context in which the actors operate
- understanding of how the context will likely evolve in the future
- list of the chosen competences to be developed internally and externally, i.e. with the help of different networks

Understanding the shared vision and a strategic intent helps the analysis of needed competences.

3. Stakeholders, Users, and Customers Identified

- describe the process of formulating challenges for the innovation camp
- analysis of the main stakeholders and customers
- list other stakeholders that might have some sort of influence
- innovative ways in which different stakeholders can be engaged in the future

Share your understanding of who might support or hinder the realization of the strategic intent.
(closely linked to phase 1 - changes in context may affect behaviours and needs of stakeholders)

4. Designed Activities and Offerings

- describe the innovation camp process and what ideas resulted from it,
- ways to develop the products/services to realize the strategic intent
- ways to modify existing products/services to reach the desired position in the market

Examine how the ideas in the IC and the chosen pilot are/were related.
Evaluate which part of the current offerings can be kept and be relevant for the future
Resulting ideas as to what kinds of new offerings should be developed.

5. Value Network Engaged

- What are the lacking competencies of the actors to be complemented?
- List located partners with these competences. New partners/contacts made in the IC?
- How are these new partners instrumental for the pilots and the strategic intent?
- List which key networks have been established

Specifically, what partnerships can be built with stakeholders that fit these networks.

6. Ecosystem Orchestration Arranged

- Describe how the existing ecosystem has been widened through Smart UP
- How was the widened ecosystem a supporting factor for the pilot?

Consider the mechanisms for a) managing the established network within which the actors operate, b) recognizing critical relationships to be managed, c) sharing benefits as motivation of each partner for the agreed relationship, while single partners may also be part of other networks.

B. INVOLVEMENT AND PARTICIPATION PROCESSES

- Methods that were used to promote, advertise, recruit, create awareness
- Who was targeted specifically, how many were reached (SMEs, citizens in an area, …)
- Did participants/participating organizations apply to join the pilot? Selection procedure?
- Aspects considered for involvement, commitment required and commitment shown,
- Time frame (short/long term?)
- Who participated in the activities (eg. professional roles, type of business, experience)

C. DETAILED PILOT ACTIVITIES

- Encounters and interventions
- Type of activities (participatory, training, testing, transforming, supporting, other)
- Feedback loop (feedback received and possible changes and updated activities)
- Was cross-regional cooperation relevant, was such collaboration achieved
-

D. RESULTS

- Impact for home region
- Impact for BSR region
- Impact beyond the BSR macro region if relevant
-

E. PERSPECTIVES OF OUTCOMES

- Learnings from perspectives of organizers, those who worked for the implementation
- Learnings from perspectives of participants (desired outcomes as expressed by participant/participating organization in the pilot)
- How did cross-regional activities take place? (eg. planned or emerging)
- Surprises
- Disappointments
- Lessons for follow-up implementations

F. SUMMARY AND FUTURE OUTLOOK

- Summary of knowledge gained
- Beneficiaries of the new knowledge
- Follow-up decisions

ANNEX II – Original pilot reports documents

DENMARK – Central Denmark Region (City of Aarhus)

Report from City of Aarhus

Sebastian Holmgård, City of Aarhus

Kim Stannov Søvsø, City of Aarhus

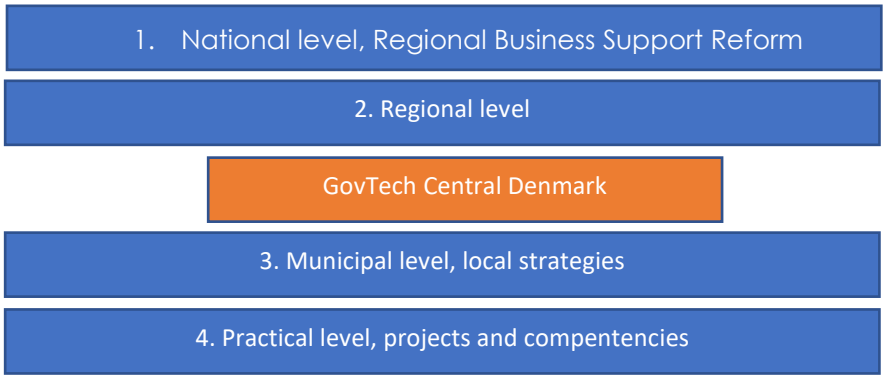
Patrick Rosengren Danielsen, City of Aarhus

Introduction

The UN Sustainable Development Goals, the climate challenge, the growing number of elderly people over the coming years, the transformation of both our own organizations and our citizens to act in an increasingly technological world. Whatever the challenge described, the solutions will contain a significant element of digitalization and implementation of technology.

The City of Aarhus' Smart-up BSR pilot project *GovTech Central Denmark* provides a proposal for how the public authorities in the Central Jutland Region can work together to intensify efforts to solve inherent challenges and make best use of *emerging technologies* with the aim of making the most of public spending.

Figure 1: GovTech Central Denmark unites the local projects, resources and competences on a regional level and builds a "proxy" to regional and national agendas on behalf of local government



GovTech is about using radical new technology such as sensors and IoT, artificial intelligence, blockchain, drones, robots, etc. to improve the provision of public services through increased efficiency and lower costs. GovTech thus points to the *inside* of the public sector organizations and helps to optimize the way we do our work. GovTech is also about entering into new collaborations and new forms of collaboration with (typically) smaller suppliers (start-ups, SMEs) and with the educational sector than what has been the traditional practice, partly to stimulate the market and partly to gain access to the latest technology know-how. Here, the small start-up and SME "speedboats" are typically way ahead of the traditional "super tanker" organizations.

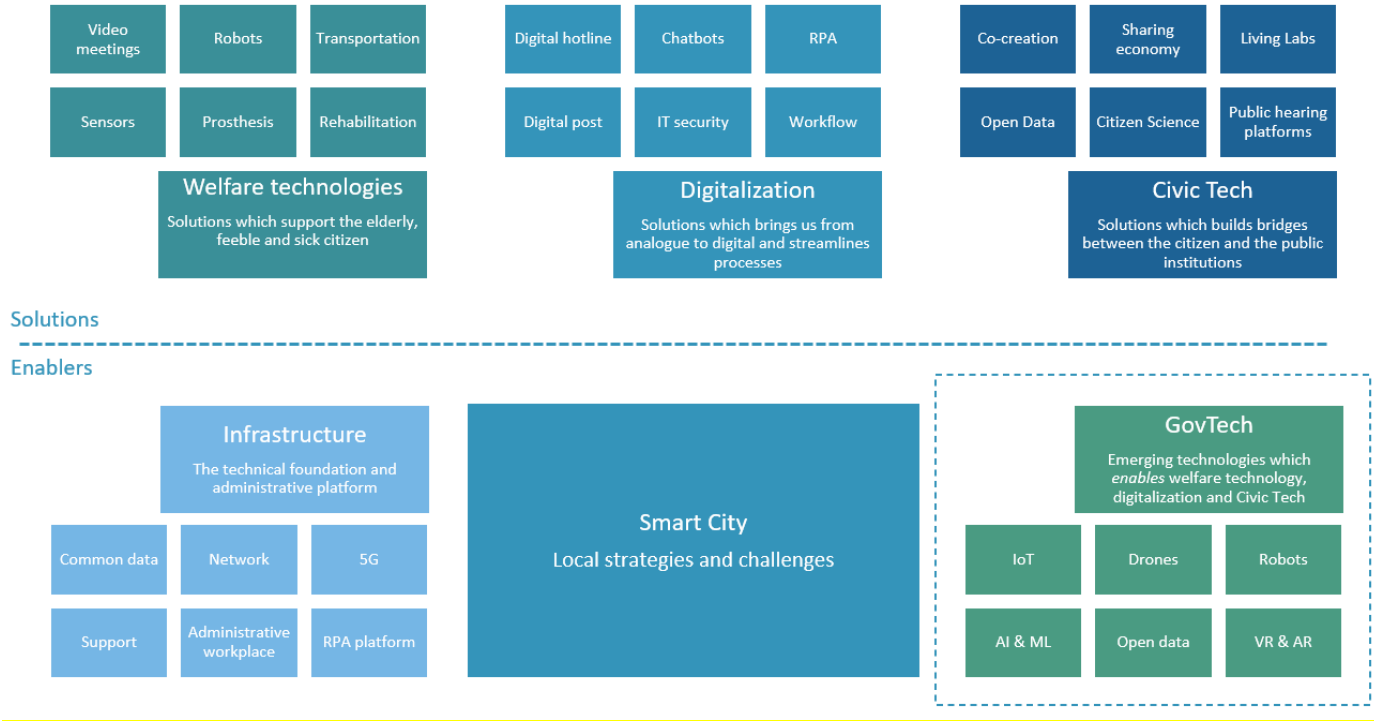
Smart Cities as a term and concept has been a valuable for many years, allowing for a shared frame of understanding and a powerful international agenda for developing and testing technological solutions and new partnerships for urban development. However, the Smart Cities concept is also ambiguous, and it can be argued that it is so broad that it covers everything and therefore nothing, which makes it difficult to operationalize. In our pilot, we present a more nuanced view of smart cities by creating a new frame of understanding, which incorporates the two complementary concepts of *Civic Tech* and *GovTech*.

Civic Tech enhances the relationships between the people and public authorities and is in other words the tools we use to build bridges between the citizen and the municipalities. It is technologies, which

enables us to include citizens to participate in the decision-making process and make their voice heard, and which allows for the sharing of data about the city. Examples of Civic Tech include co-creation, public hearing platforms, open data, living labs and citizen science.

GovTech is the public institution's use of radically new technology to improve the delivery of public services through increased efficiency. GovTech complements the traditional technological infrastructure with emerging technologies, which allows the municipality to utilize other smart city solutions, i.e. digitalization, welfare technology and Civic. Examples of GocTech include the Internet of Things, drones, virtual reality, artificial intelligence and machine learning. In a sense, GovTech can be thought of as the public institution's *operating system,* enabling them to deliver efficient services, while Civic Tech is the citizen's *operating system*, enabling citizens to connect with decision-makers.

Figure 2: GovTech conceptual framework



Pilot: GovTech Central Denmark

GovTech Central Denmark is a trans-regional initiative with the purpose of enabling municipalities to explore, test and implement emerging technologies. The centre is an initiative by the 19 municipalities in Central Denmark, the Region of Central Denmark and Business Region Aarhus and Business Region MidtVest. In total, the public authorities represent more than 1.3 million citizens and includes some of the most vibrant innovation hubs, exiting tech clusters and forward-thinking public authorities.

GovTech Central Denmark is the product of the realisation that we are facing the same challenges and that we can get further for the same resources by working together. GovTech Central Denmark is a platform and an organization where public authorities can come together and form more structured

partnerships than what has traditionally been done. The centre will have a permanent staff of 6 employees who will manage the day-to-day operation, examine funding opportunities and consult municipalities in the projects. The individual projects, which are developed in GovTech Central Denmark can either be managed in a decentralized manner by the one of the municipalities or directly by one of the permanent staff in the centre. Furthermore, the municipalities have the option to have one of their employees stationed in the GovTech centre for an extended period (a minimum of 6 months). This will allow municipalities to improve the qualifications and experience level of their employees and will allow GovTech Central Denmark to draw on the competencies and expertise of all municipalities in the region.

GovTech Central Denmark will be a network and an organization, which has the expertise and resources to - on behalf of the network - explore, develop and test technologies in concrete projects and solutions, which the municipalities easily can implement afterwards. GovTech Central Denmark will have four focus areas:

1) **Project development**: maintain a common technology radar; benchmark the market and suppliers; testing technologies and getting hands-on experiences; advice municipalities in choosing and setting up equipment; identify concrete needs, use-cases and business-cases¨

2) **Establish and manage projects**: establish best-practices for public-private partnerships; establish development partnerships in areas where the market is not yet established

3) **Purchase and implementation**: establish best-practices for purchasing and calls for tenders; formulate standards for purchasing IoT-solutions, drones, AI-services, etc.; ensure data ownership and open data; assist in organizational implementation

4) **Dissemination of knowledge and competence development**: be a centre for competence development; develop and distribute IoT-"starter kits"; arrange inspirational workshops and presentations; maintain a catalogue of use-cases and best-practices

GovTech Central Denmark is an attempt to get more done with the same resources, but it is also about establishing a much more vibrant innovation ecosystem. For the public authorities, GovTech Central Denmark will be a platform for cooperation, competence development and knowledge sharing. It will allow municipalities to develop and implement solutions, which would be unattainable on their own. For companies and suppliers, it creates a much larger and more cohesive market where suppliers have a single-entry point to contact and sell products to all the public authorities. For the region, GovTech Central Denmark is a way of positioning and strengthening the Region of Central Denmark as an innovation cluster nationally and internationally.

Alongside the establishment of GovTech Central Denmark, Aarhus is developing several complementary projects, which have significant overlaps. One of these projects is Aarhus City Lab, which is Aarhus Municipality's digital playground for innovative smart city solutions and a platform for having dialogues with citizens about the role of technology in our society. Aarhus City Lab is a place where the municipality can cooperate with local actors who are interested in developing and testing new technologies, i.e. Aarhus University, SMVs, tech companies and suppliers, entrepreneurs, students and citizens. Aarhus City Lab is a living lab, which means that it provides a venue where experiments can be setup in a realistic use-context and that the end-user is an active participant throughout the process.

Aarhus City Lab acts as a single point of entry into the municipality for external partners: facilitation and coordination are key aspects of Aarhus City Lab to ensure that the right people are matched. Furthermore, Aarhus City Lab acts as a forum for dialogue between citizens and the municipality. Aarhus City Lab is placed pier at the very heart of the city and is a very well-visited area during the summer months. Therefore, it offers great opportunities for the municipality to meet and engage with citizens. Aarhus City Lab will regularly host presentations, provotyping, host Open Lab every Friday and have a mobile office during the summer months.

Pilot: IoT Suitcase

As a much more concrete part of the pilot, the ITK department in Aarhus Municipality (Aarhus ITK) is also developing an IoT-suitcase, which contains a wide variety of sensors that can be utilized in a range of different Smart City applications. The IoT suitcase is a starter kit, which municipal departments could purchase to start experimenting with IoT solutions or to suit specific needs. A solution like the IoT suitcase will also be made available in GovTech Central Denmark where municipalities can get guidance in getting started using IoT sensors and get consultation on purchasing an IoT-starter kit.

Figure 3: The IoT suitcase containing a basic set of IoT sensors for learning and easy deployment

Projects do not exist in a vacuum, but rather build on other complementary projects in a larger context. There are overlaps between the pilot projects, especially with Aarhus City Lab being a test facility for innovative smart city solutions. Some of the solutions developed in GovTech Central Denmark could easily be tested on a small scale in Aarhus City Lab before scaling the solutions and implementing them at a much larger scale across the region. Aarhus City Lab also has the potential to be scaled further and developed as a regional living lab to complement GovTech Central Denmark. Furthermore, and significantly, the pilot projects' innovation ecosystems are complementary meaning that GovTech Central Denmark draws on the partnerships that has already been established in Aarhus City Lab and vice versa.

Why there is a need

In recent years, several municipalities have worked diligently to explore, test and implement IoT solutions, e.g. by installing sensors in waste bins, setting up IoT networks in municipal buildings, measuring the indoor climate in municipal buildings, or counting cyclists on the local mountain bike routes. The work is often driven forward by technology savvy individuals and supported by informal sparring with other municipalities that have tried similar solutions. The activities can also be initiated at the initiative of local suppliers and consultants, who are very happy to establish test solutions as part of their strategic sales work.

Despite the many initiatives and informal collaborations, work on understanding and implementing new technology for many municipalities continues to be difficult to push, in a busy everyday life. It takes focus, skills and time to become familiar with radically new concepts and fields such as sensor technologies, data transmission, machine learning, drones and data visualization. This can be difficult to find to the desired or necessary extent and in a daily life characterized by a focus on more traditional digitization and operational issues – even despite the great potential that radical innovation holds down the road. Even larger municipalities have doubts about which direction to go, what technologies to focus on, where to buy the right equipment, how data is best processed and presented, and which technology providers are the right ones to collaborate with. The experience across public authorities is such that there is still a great task - political as well as practical - in describing potentials, allocating resources and coming from pilot project to large scale solutions.

For several years, the use of technology by public authorities has been articulated under the concept of Smart City. A recent analysis[29] of the Danish market for Smart City by Damvad Analytics on behalf of Smart City Cluster Denmark, reveals that there are currently 18,000 FTE working in Smart City related jobs in Denmark and revenue in Denmark is already estimated today to be $ 32 billion. If Denmark further embraces global growth in the Smart City area of 12-17 percent per year, it could lead to up to 53,000 jobs in 2025. That's 35,200 additional employees in the field in just six years.

The analysis also highlights the need for more competencies, standards and focused collaboration if we are to lift the public authorities' ability to exploit new technology to a new level where these growth potentials can be met. Investing in and developing new smart solutions is crucial for the public sector to meet the citizens' expectation of ever smarter and better public services within the given economic framework.

In other words, there is a strong need to build up knowledge and skills internally in the public sector, so that the public sector can push the development in a desirable direction and achieve the desired benefits. Much is already underway, and many initiatives are supported by existing collaborations, as well as by Smart City and Open Data initiatives in national digitization strategies - but, as the Damvad analysis points out, even more coherence is needed as well as community thinking and common direction.

Denmark has a strong tradition of cross-municipal knowledge sharing and collaboration on, amongst other things national IT infrastructure, digitization strategies, common municipal platforms, Open Source, Open Data and different digital and Smart City clusters. Here work is done to ensure common progress, standards, catalogues of inspiration and low-practical templates for the benefit of the community.

[29] https://smartcitycluster.dk/wp-content/uploads/2019/08/SmartCityClusterDenmark_analyse_web.pdf (in Danish)

City of Aarhus plays a significant role in several of these existing initiatives and because of the potential rewards of further collaborating on the uptake of emerging technologies, City of Aarhus has chosen to also spearhead the *GovTech Central Denmark* initiative by framing the potentials, scoping the collaboration and ensuring buy-in from the 19 municipalities in the region as well as the Region itself.

To sum up: It is only a natural next step to establish a strong, cross-cutting collaboration on emerging technologies and the GovTech area in the Central Denmark Region. The public authorities in the Central Jutland region have the opportunity to create a significant position of strength in this area and at the same time scale good and sustainable solutions to the benefit of the community, thereby helping to save resources and solve the challenges facing society today. Some of these solutions will be municipality-specific and are based on the challenges of individual municipalities. Other challenges are transversal and are more pronounced in the regional work, still with a high degree of commonality. This requires more cross-sectoral cooperation, and it is especially on these challenges that the potential of collaborating more formally on the development of common, sustainable and scalable solutions can benefit the entire region and position the region as a European front runner.

Given the shift in responsibility regarding stimulating business and growth away from the regional level to the municipality level, it is imperative that City of Aarhus will embrace this responsibility and opportunity to establish the city as a large-scale testbed for innovative urban solutions that can stimulate growth in the area. Central municipal strategies such as the Climate Plan and the Smart Aarhus strategy will play a key role in forming this.

A necessary shift in focus

Aarhus is the second largest city in Denmark and is one of the most advanced cities in innovation, technology and smart city solutions. As the largest city and municipality in the Region of Central Denmark, Aarhus spearheads the development of smart cities in the Region. However, the many of the remaining municipalities in Central Denmark are not as advanced in terms of innovation and technology and the smart city-agenda is difficult for many of the smaller municipalities and cities. It requires resources, knowledge and expertise, which many of the smaller municipalities simply do not have. Even for a large city like Aarhus, it can be difficult to work with new technologies on a scale that really matter. Therefore, the municipalities have decided to band together and find common solutions to common problems.

Aarhus Municipality has taken the lead in the initiative and GovTech Central Denmark will physically be placed in Aarhus, more specifically, in Aarhus ITK – a division in Aarhus Municipality working with innovation and technology. Aarhus ITK has extensive experience in developing and managing innovation projects and spearheads Aarhus Municipality's exploration of emerging technologies. Examples of this include using virtual reality to counter social anxiety when taking the bus or going to the dentist; using crowd sensing and citizen science to map and combat air quality issues; utilizing drones to detect oil spills and robots to clean up the oil; setting up thermal cameras to quickly and accurately detect if someone falls into the river in the city centre; and much more. Aarhus ITK participates in several European projects and already leads several cross-municipal initiatives and networks, such as Open Data Denmark, which coordinates public institution's promotion of open data, and OS2, an open source and digitalization network consisting of 69 Danish municipalities.

Evidently, cross-border cooperation is integral to Aarhus ITK and is an important priority. It is based on the idea that we are stronger together; that progress should be shared, and smart and innovative solutions should be made available to all. That is why open source and open data is such an important part of Aarhus ITK's work. This is also the main idea that the pilot is meant to promote further.

GovTech Central Denmark is an attempt to do more together and find common solutions to common problems.

The main stakeholders in our pilot are municipalities. GovTech Central Denmark will provide a platform and organisation where public institutions can pool resources, knowledge and experience to explore technologies that would be unattainable for the individual municipalities. It also allows us to test scalable solutions, which can more easily be implemented across municipalities and across borders. Furthermore, GovTech Central Denmark will give the municipalities a more cohesive and much stronger purchasing power, which allows the municipalities to make more specific demands to suppliers instead of solely relying on "stock solutions". Finally, GovTech Central Denmark will position the Region of Central Denmark nationally as well as internationally as a Smart City powerhouse and frontrunner.

The GovTech Central Denmark consortium currently consist of 19 municipalities, the Central Denmark Region and the two business organizations Business Region Aarhus and Business Region MidtVest. As we get further in the development of the GovTech centre, we will increasingly include a wider range of stakeholders, i.e. SMVs, suppliers, larger tech companies, business organizations, universities and knowledge institutions, etc.

The process of establishing GovTech Central Denmark began with forming a strong project group, which would spearhead development of the concept, formulate the vision and intended activities and suggest a governance model and budget. The project group consisted of chief digital officers from three municipalities (Aarhus, Favrskov and Horsens), directors from the two Business Regions and Heads of Offices from the Region of Central Denmark. This project description was then presented to the remaining municipalities at the kickoff meeting.

Members of the initial project group included:

- Aarhus Municipality
- Horsens Municipality
- Favrskov Municipality
- The Region of Central Denmark
- Business Region Aarhus
- Business Region MidtVest

Strategic intent of the pilot

The Danish Business Promotion Board has identified[30] a number of driving forces to further strengthen the region – entrepreneurship, green growth and circular economy, innovation, digitization and internationalization – along with a number of key specialization areas/industries that will play a key role in the Central Denmark Region going forward. These include areas such as foods, energy and environmental technologies, digital technologies, business tourism and innovation within health, IT and creative professions.

The purpose of *GovTech Central Denmark* will be to create a strong link between the public authorities in the region and the businesses by:

- Supporting the public authorities in the region to further push forward the area of public digitalization that is about understanding and leveraging radically new technology

[30] https://erhvervsfremmebestyrelsen.dk/sites/default/files/2020-03/Erhvervsfremme-i-Danmark-2020-2023_Strategi.pdf

- Serving as a working community and platform for upskilling employees in understanding and working with development, procurement, implementation and use of e.g. IoT technology, drones, robots, artificial intelligence and similar technologies through on-site and virtual project participation
- Stimulating the local business community and seize the opportunity for growth in the area
- Creating a position of strength in the Central Denmark region in the Smart City and GovTech areas, based on both the municipalities' and the Region's needs
- Developing concrete solutions for use in the municipalities and in Central Denmark Region
- Establishing and coordinate the collection and sharing of knowledge, know-how and best practices in the field across actors in the region
- Establish new forms of collaboration with the education sector and in this way support as well as utilize the innovation capacity of the educational institutions in the region, e.g. by having ongoing collaborations with various fields of study, where the municipal challenges and the Central Denmark Region's challenges are brought to the attention of students who through projects create innovative concepts or solutions based on the latest research and knowledge of technology etc.
- Creating a joint organization that can both absorb and influence the national and European agendas in the field, including forming a strong and competent interface against Danish government agencies such as KL, DIGST, ERST, EU, OASC and others. on e.g. data standardization and fair AI
- Developing and driving a shared strategy in this area

How the innovation camps have contributed to our work

During the innovation camps in Smart-Up BSR we have gained deep insights into the local challenges and opportunities of the hosting cities and regions as well as those of the other participant's and have thus been forced to view our own challenges and opportunities in a new light. The sessions with multiple helix working groups provided not only valuable insights but also new ideas formed in the intersection between cultures, nationalities, professions and people. The insights and ideas ranged from very concrete ready-to-build methods, tools or systems to abstract, innovative and strategic perspectives on how to tackle city challenges.

The network established through our participation in the Smart-up BSR had proven of high value as we have been able to extract learnings from other regions that are strong on these kinds of cross sector, cross function collaborations. One example is our visit to Forum Virium during the Espoo Innovation Camp where we had the opportunity to discuss different approaches to collaboration, innovation and organization with them. Furthermore, we have utilised the SmartUp-BSR network to research on other successful partnerships in the Baltic sea region and will continue to do so going forward. The interpersonal relationships that the SmartUp project has helped establish is of high value.

About the process

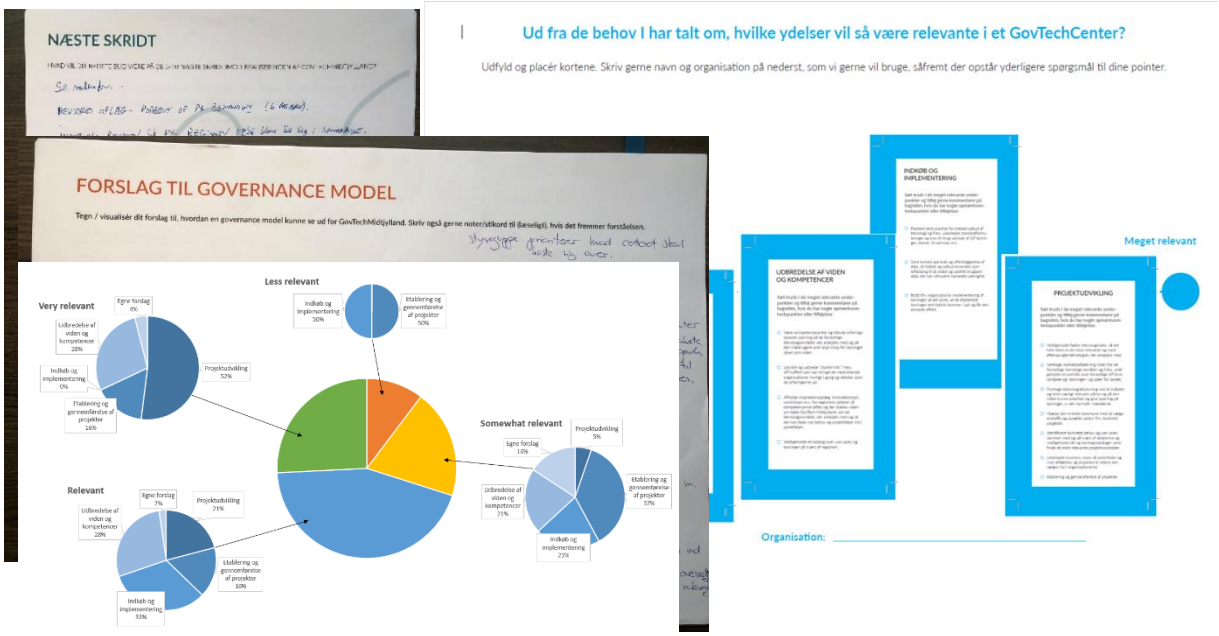
In March 2018, Aarhus hosted a Smart-Up BSR innovation camp with more than 70 participants from Denmark, Finland, Estonia, Latvia, Lithuania, Russia, Poland, Germany and Norway. The innovation camp was the first large in the Smart-up BSR project and over the course of four days, the innovation camp focused on how to cooperate and find common solutions to the contemporary Smart City challenges and allowed the participants to share ideas, experiences and knowledge. The workshops were facilitated by Aarhus ITK and Center for Innovation Aarhus (CFIA) and introduced the participants to the methods, approaches and initiatives, which makes Aarhus a European leader in the area.

Shortly after the innovation camp, however the Danish government passed the reform to the Regional Business Development system, which meant that the Regions could no longer engage in activities which promotes business. It also meant that the Smart Specialization Strategies, which had previously been formulated by the Regions, would now be formulated at the national level by the Danish Business Authority. Up to this point, the Region of Central Denmark had been an associate partner, but the reform meant that although the Region would continue to be involved with the pilot for certain aspects, they could no longer participate as associate partner in Smart-up BSR. The pilot therefore had to be rethought.

Alongside this, a project group headed by Aarhus Municipality began to develop an idea to create a transregional unit to cooperate on IoT and smart cities strategically and at a larger scale than what is possible in the individual municipalities. This process has been ongoing for a while but began in earnest in the fall of 2019. During the process, the project group developed a more nuanced concept of smart cities with the introduction of GovTech and it was agreed that the center should focus on enabling the public authorities to explore, test and implement emerging technologies. As part of this process the stakeholder ecosystem around the GovTech Center was orchestrated and small coordinating meetings was arranged.

The kickoff meeting was held 9. March 2020 and was attended by chief digital officers and consultants from 15 municipalities, directors from Business Region Aarhus and Business Region MidtVest and Heads of Offices from the Region of Central Denmark. A total of around 30 professionals attended the kickoff meeting. The meeting was structured with presentations with several workshops in between. The workshops were designed and facilitated by Center for Innovation Aarhus (CFIA). The workshops were intended to clarify the aims and activities of the center, the barriers for implementation and to determine a governance model, including the organization and budget. See the pictures below to see the material that was used in the workshops.

As of May 2020, we are in the process of seeking formal commitment from the stakeholders and are elevating the strategic level by involving the Municipal Chief Executives.



The GovTech center will complement the individual municipalities' strategic work with Smart Cities and the national and regional priorities in the new Business Development Strategy, which is considered the Smart Specialisation Strategy.

ESTONIA – City of Tallinn

A. Importance of the pilot

1. Needs and Potentials Identified

For the Smart-up BSR project Tallinn City has chosen smart city as the spearhead topic for its pilot. The reason for this was to build on top of already existing competencies in ICT. Also, Tallinn City is interested to be a smart city hub in terms of RDI, practical use of new solutions and attracting companies in this field. As part of its pilot, Tallinn City together with the Baltic Innovation Agency (BIA) has developed a smart city project assessment tool which the city plans to use starting from this summer.

Tallinn City is currently involved in a large number of different projects either as a regular project partner or less so as the lead partner. The system is based on bottom-up logic. Usually it is the individual departments or other city-affiliated organisations that start or get involved in different projects by getting an invitation from a lead partner. After that the department has to show to the city's strategy unit that the project helps to fulfil the city's development plan. If strategy unit gives it accept, the department has to defend the project before the City Council. Usually most of the project ideas get the accept from both the strategy unit and the City Council.

There are several reasons why Tallinn Enterprise Department wanted to change project development processes in the city. The awareness about new project initiatives has been low in different departments of the city government. Although all projects are in a project database, this does not ensure that different departments and decisionmakers know what is happening. This led to a situation with two problems. First, different departments were sometimes involved in similar but separate projects. Second, when entering and developing new projects, the departments did not analyse how the project could impact the activities of another department.

In addition, as most of the project ideas manage to get through the strategy unit and get accepted in the City Council, there is a question of how thorough the strategy unit as a filter is. If projects are only loosely related to the actual goals of the city's development plan, then we can expect inefficient use of human and financial resources which would be needed for more important activities.

Tallinn City Government envisions that by renewing its project development processes the city can:

- better evaluate each project's economic impact and link with the city's priorities;
- use financial and human resources more efficiently and effectively;
- establish a thorough overview of projects and resources in use;
- and make sure that projects are run on the same principles.

2. Strategic Intent Formulated

Tallinn Enterprise Department organised the SWOT workshop in November 20, 2018. The facilitator of the workshop was consultant Mart Repnau who previously has also worked in Tallinn Enterprise Department. The SWOT workshop was based on scenarios developed by Helsinki-Uusimaa Regional Council.

Strong ICT sector, lively start-up scene, competitive tradable services, and trustworthy internet and web environment were identified by the participants as the main strengths of Tallinn and the surrounding region. In the context of climate change, it was found that the location of Tallinn can alleviate the negative effects of climate change and undesired migration problems. It was also noted that the region can be self-sufficient during the crisis.

Weaknesses related to the size, scale and structure (population, economy, resources), and limited attraction of talent were identified in the context of growth & globalisation. Protectionism and segregation/polarisation can harm Tallinn in two ways. First, the city functions as the country's international gateway. Second, Tallinn is smaller in comparison to other cities in the region.

It was identified that alignment with Scandinavian countries is the biggest precondition for favourable business opportunities (Scandinavia as the home market, joint sales and promotion abroad). Pan-regional development can be facilitated through meso-level strategies, e.g Baltic Sea Region Strategy. Trade barriers can create opportunities in the context of lesser competition from Asia. Liberal migration can provide access to talent beyond the EU, mainly Ukraine and Belarus.

The biggest threats to the region and Estonia as a whole were seen in the context of disintegration & fragmentation scenario (EU, NATO, eurozone) as the resulting risks of currency vulnerability or national security (Russia). Another aspect identified in the context of polarisation and segregation is the small size of the country and region together with two separated language groups in Tallinn City Region. Another threat identified was change in domestic policy as a response to the external developments if the new policy will focus on contraction and enclosure.

The SWOT analysis supported to include some of the topics and issues into the new Tallinn Development plan for 2021+ such as the issues with segregation in Tallinn City and attracting international talent.

Resulting ideas as to what kinds of new offerings should be developed.

Tallinn City Enterprise Department organized Tallinn Innovation Camp which was held in September 17-19.

The venue of the camp was Innovation and Business Centre Mektory. The first day of the camp began with several presentations:

Kristjan Lepik (product manager, Topia) - "Where will people go?";
Hannu Tuomisaari (Senior Adviser, the City of Espoo) - "Espoo - the city of sustainable growth";
Dr. Anne Stenros (CEO, Senior Consultant, GrowthPro; former Chief Design Officer for the City of Helsinki and KONE Corporation) - "Future City - Open City - Towards people-oriented urbanism";
Toomas Haidak (Head of Strategy Unit, Tallinn City) - "Tallinn - the city where the future is now".

The idea behind the presentations was to provide an introduction into the challenges. The camp had ca 100 participants who were divided between 7 teams that solved 3 different challenges:

1) Challenge 1: How to smarten up the region?

2) Challenge 2: How to increase citizen participation and promote co-creation to improve living environment and quality of life?

3) Challenge 3: How to make the city digital with the help of artificial intelligence and co-creation?

Amongst the participants were representatives and experts from other partner organisations of the project, city officials and master's students. During the camp the 1st Vice-President of Committee of the Regions, Mr. Markku Markkula also delivered a speech titled "Digitalisation Progress and Challenges in Europe. During the last day of the camp, Professor Marianne Huang from Aarhus University delivered a presentation about co-creation and what has been done in the City of Aarhus.

The challenges were very strongly focussed on how to improve urban space and utilize digital solutions in the city. Several interesting solutions were pitched by the participants. One of the ideas under Challenge 1 was an app which by using gamification features would provide users a possibility to map out areas that need improvements (e.g large piles of trash, infrastructure that needs repairs etc). The second idea under Challenge 1 was a collaboration platform targeted towards apartment unions. Two ideas were pitched under Challenge 2 which focussed on revitalizing old ABC centres and closing the gap between the city government and local communities by hiring community managers in large apartment block areas. Challenge 3 focussed on AI under which two ideas were pitched. First, an AI solution which would manage the traffic flow. Second, an AI-based reporting tool for citizens.

Although the idea of the Tallinn pilot did not emerge from the innovation camp as the need for changes in the project development surfaced later, several ideas developed during the camp have moved forward. For example, the use of AI in traffic management was an idea under discussion in Tallinn City already before the innovation camp, the event and the pitched

idea gave an additional push to move forward with it. At the moment, Tallinn City is one of the six partner cities (other cities include Amsterdam, Helsinki, Paris Region, Copenhagen and Stavanger) in AI4Cities project where the idea is to use pre-commercial procurement process to procure AI solutions in the fields of energy and mobility to move towards carbon neutrality. Although the exact procurement projects are not yet decided, the City of Tallinn has shown interest to use the project to procure an AI solution for traffic management.

Tallinn City is also a partner in the project CENTRINNO. One of the initial reasons why Tallinn joined the project was the potential to test out the idea of having community managers. However, as the project is only starting, the exact activities have not been decided in detail yet.

3. Ecosystem orchestration arranged

Smart-up BSR has definitely helped Tallinn City to establish contacts with different project partners. In addition, the cooperation between the city government and Tallinn University of Technology has also strengthened. The Innovation Camp format has been adopted by the Tallinn Science Park Tehnopol[31]. It has developed its own innovation programme called Momentum which is offered as a service for companies and public sector organisations to develop new products and services.

More information about Momentum can be found through the following link: https://www.tehnopol.ee/en/momentum/momentum-case/

The implementation of Tallinn pilot is not so much dependent on the wider ecosystem as the focus is on changing the internal processes in the city. However, implementing the pilot can help to build stronger ties with actors in the local ecosystem and in the BSR region through more meaningful projects.

B. INVOLVEMENT AND PARTICIPATION PROCESSES

As the pilot is focussing on the city's internal processes, a wider circle of stakeholders was not involved.

Tallinn City has chosen smart city as the spearhead topic in this project. This focus on smart city activities thanks to this topic has helped the city to support and start several different initiatives. One of such initiatives is the chosen pilot which indeed does not include a wide range of stakeholders as it is focussed on the city's internal processes. However, the other initiatives have been more collaborative.

In cooperation with Tallinn Science Park Tehnopol, Tallinn City has launched its own innovation fund called Tallinnovation to find and implement smart city solutions in Tallinn. The fund distributes funding on a competitive basis. The goals of Tallinnovation are:

[31] Together with the state, both Tallinn City and TalTech are the founding members of the foundation of the Science Park Tehnopol.

- to support cooperation between the City of Tallinn and technology companies by enabling the use of innovative software or hardware products in the City of Tallinn;
- to support the City of Tallinn's ambition to make the city environment more modern, sustainable, citizen-friendly, and open;
- to introduce innovative smart city solutions, products, and services to the City of Tallinn;
- to raise the awareness of Tallinn City employees and officials about new possible innovative developments in the urban environment.

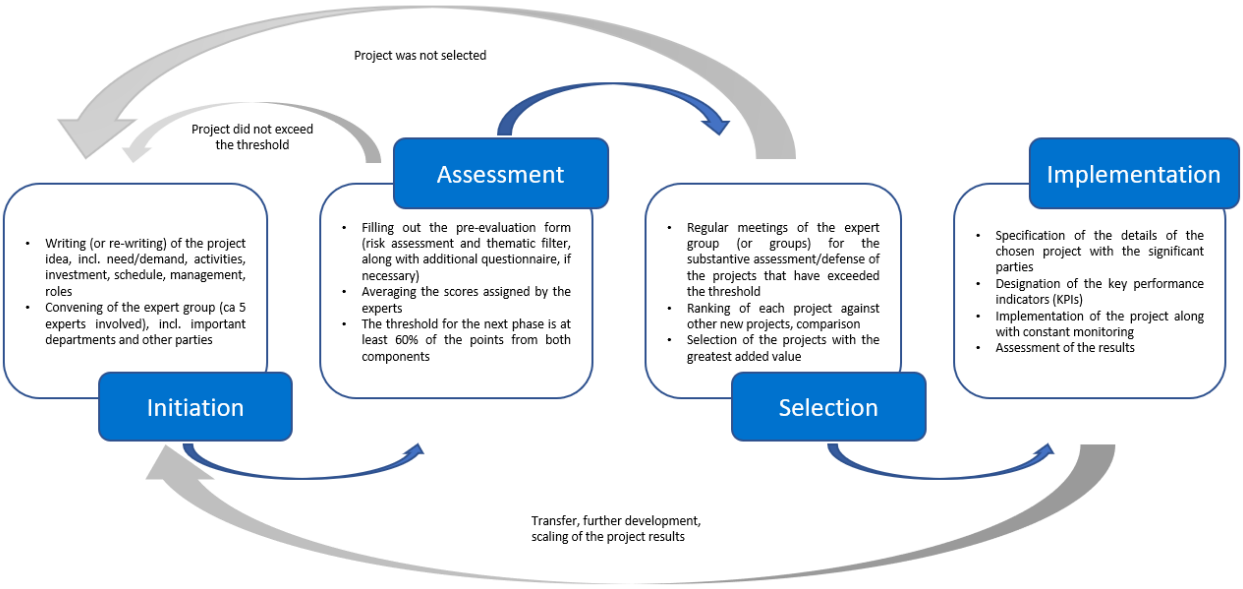
More information can be found through the following link: https://innovatsioonifond.tehnopol.ee/en/#goal

Tallinn City has financially supported the establishment of smart city professorship in the School of Engineering at Tallinn University of Technology. A number of other stakeholders have been involved with the establishment of smart city professorship such as Ericsson, AS Mainor and different private companies located in Ülemiste. Together with Technopolis, AS Mainor is the major developer of Ülemiste area. The company supported the establishment of the professorship with 500 000€. In addition to research in smart city area which by nature is interdisciplinary, the aim of the professorship is to support the collaboration between Tallinn University of Technology, Tallinn City, private companies involved in the development of smart city solutions and real estate developers in Ülemiste.

C. DETAILED PILOT ACTIVITIES

The first pilot activity was the writing of the report by BIA. The aim of the report was to compare Tallinn City to other important cities in the region from smart city perspective. This list included Helsinki, Riga, Vilnius and Copenhagen. The report looked at where these cities are located in different (smart) city rankings and what are the most notable smart city developments/initiatives in these cities. BIA also conducted a SWOT analysis by interviewing a number of experts from the local smart city ecosystem and using previous analyses, different strategies and the previous Smart-up BSR SWOT analysis. Based on this analysis, BIA provided a number of recommendations for Tallinn City such as supporting real-life piloting, organising smart city hackathons, bigger use of innovation procurements etc.

In addition, the Baltic Innovation Agency developed a smart city project assessment tool for Tallinn City which could be used to assess all new ICT and smart city project ideas. The assessment tool focuses on risk assessment and potential benefits that the project can bring in different areas (economy, governance, environment, people, living, energy efficiency, mobility, ICT). This new assessment tool will play an important role in renewing project development processes in the city. Figure 1 shows how the new process will roughly look like.



The role of the assessment tool is to provide ex ante evaluation for project proposals. Projects that get a score of at least 60% both through the assessment tool and from the experts will move to the selection round. The selection will be made by a committee which consists of experts from different city departments but also from outside.

D. RESULTS

The new project development process together with the evaluation tool has not yet been implemented. The potential results as already described in Section 1 can be the following:

- Tallinn City can better evaluate each project's economic impact and link with the city's priorities;

- more efficient and effective use of financial and human resources;

- a thorough overview of projects and resources in use will be established;

- make sure that projects are run on the same principles.

There can be also wider impacts at the BSR region level. On the one hand, when Tallinn City will more carefully select projects where it wants to participate, other organisations/cities in the region might find it difficult to involve Tallinn as a partner. On the other hand, if this new approach helps the city to prioritise human and financial resources, Tallinn City could be involved into larger and more sophisticated projects.

E. PERSPECTIVES OF OUTCOMES

The actual implementation planned into this summer 2020 has been postponed because of the Covid-19 and structural changes in the city government described above.

FINLAND – Helsinki-Uusimaa region

1. Needs and potentials identified

The mapping pilot of Helsinki-Uusimaa aims for more effective coordination of local stakeholders´ efforts hopefully leading to novel and new Active and Healthy Aging (AHA) actions, research and innovation. Here the target group are the public and private actors involved in developing AHA measures and bringing healthy ageing into practice.

The pilot seeks to find common ground on AHA and the digital transformation in health care. The impact of the pilot and value for the home region and/or BSR region needs careful planning.

With this piloting we aim to find best ways for different stakeholders to strengthen AHA networks, to learn from each other and to form combinations of skills. The mapping exercise will foster both local and cross border co-operation in the BSR. Regions will benefit of new visions and collaboration possibilities on the AHA.

2. Strategic intent formulated

A SWOT-analysis of the Region´s capabilities was drawn in the early stages of the Smart-up BSR project. The aim of the analysis was to find strengths and opportunities as well as weaknesses and threats for Helsinki-Uusimaa in the future.

The analysis was made to give background for preparation of our new smart specialisation strategy. One of the findings was that we have the elements for strong RDI ecosystem, but we still need to boost the cooperation between actors and enhance the sharing of information.

This piloting of mapping the information of actors on a specific field and sharing the information to be used by the actors in the ecosystem is one answer to this need.

3. Stakeholders, users and customers identified

The pilot of active healthy ageing was jointly discussed in the Tallinn camp. There was some interest towards it, but the partners had more urgent needs in other piloting themes. The exercise of mapping AHA-actors was still

important for Helsinki-Uusimaa and we decided to pilot the work and share both the learnings and information among all the partners.

4. Ecosystem orchestration arranged

The Smart-up BSR -project has linked us more closely to the partnering regions. Most important has been the knowledge and personal contacts in the field of smart specialisation strategies that we have gained. The project has given us a wider understanding of the different ways to prepare and implement a strategy for smart specialisation.

The local stakeholders who have participated the innovation camps have got important new contacts. Especially the representatives from the Urban Mill could share their experiences of running a local innovation ecosystem and get access to new partnerships in the BSR-region.

There is a great potential for future connections on the active healthy ageing -sector once the piloted mapping of actors will be further developed to be a digital tool. This will come in a later stage though.

FINNLAND – Kymenlaakso region

1. Needs and Potentials Identified

Geographical location and history have been of great importance to the region when selecting a certain spearhead in the Smart-up BSR project. Kymenlaakso is a region located in the South-East of Finland on the coast of the Baltic Sea and on the Gulf of Finland. Kymenlaakso is one of the most significant forest industry clusters in Europe and an international hub of logistics and logistics related business and knowhow in the Baltic Sea Region. Finland´s largest universal export and transshipment port, Port of HaminaKotka, is situated in the region as well.

As stated above, Kymenlaakso´s economy has relied and still relies heavily on its operating ports and port related activities (especially logistics). This is essential for the region. Port-related activities and business have a long tradition in the region - valuable know-how and relationships have been accumulated for decades.

Additionally, in Kymenlaakso in its sub-region Kotka-Hamina port areas are being developed currently very strongly and new investments with substantial amounts of euros have been brought out to the public during last few years. Lots of projects are presently going on in the Kotka old port area which further emphasizes and increases the importance of region´s port areas and related development activities to the economic well-being of Kymenlaakso (particularly for the southern part of the region i.e. Kotka-Hamina region).

Kymenlaakso region implemented its RIS3 strategy process during 2015-2017. At the end of the process three spearheads were chosen for region´s research and innovation strategy for smart specialisation (RIS3) for 2016-2020. Chosen spearheads were:

- logistics (safety and intelligent logistics)
- bioeconomy (new products and business from resource-efficient and low-carbon bio- and circular economy)
- digitalization (cyber security and gamification and digital applications in logistics and bioeconomy as well as in tourism and health and well-being).

All the above influenced the choice of a spearhead for Kymenlaakso region in the Smart-up BSR project. Smart city and smart port were envisaged the most suitable spearheads for Kymenlaakso due to above mentioned reasons. Themes of sustainability and circular economy have begun to gain prominence in the last couple of years also -a strong growing trend is that port areas attract investments in bioeconomy and renewable energy as well. It seems, that all today´s development activities and investments must also have an ecological aspect considered in some way.

2. Strategic Intent Formulated

Kymenlaakso region´s RIS3 strategy related SWOT synthesis exercise was executed in January in 2018. All region´s relevant innovation actors/ stakeholders were invited to take part in this workshop. The goal was to deploy RIS3 strategy for forecasting and better understanding region´s future development via scenarios and SWOT analyses.

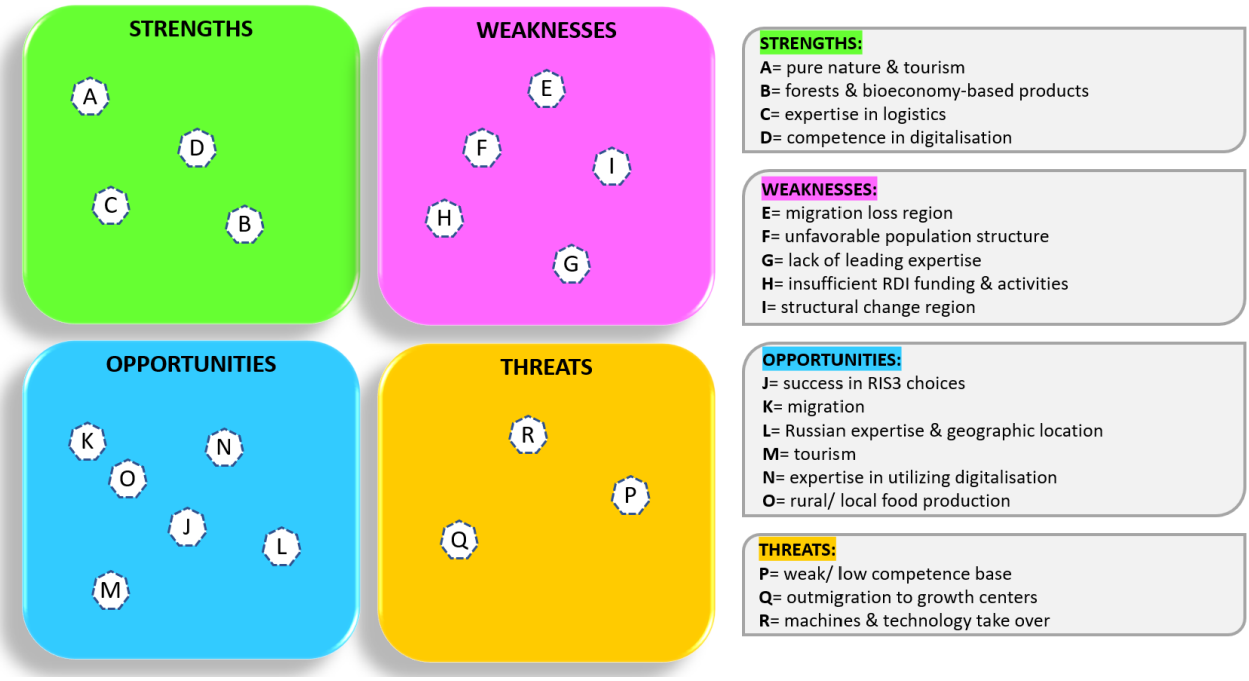
Helsinki-Uusimaa region delivered 5 different scenarios (1: Protectionism and traditional government power, 2: Polarized individualism and expert power, 3: Reliance on local communities, 4: Global and networked tech-imperialism and 5: Growth and EU-driven international co-operation) for project partners for RIS3 strategy related SWOT synthesis work during Aarhus Innovation camp on 18th-21st March. These different scenarios described alternative future development in the operating environment by 2050.

Cursor Oy like all other partners used these scenarios to elaborate SWOTs for their own regions. Scenarios were essential tools in mapping the possibilities and risks of regions´s alternative futures.

Cursor Oy gathered together relevant innovation actors from Kymenlaakso region (Regional Council of Kymenlaakso, Kouvola Innovation Ltd., South-Eastern Finland University of Applied Sciences and leaders of thematic RIS3 working groups (logistics, bioeconomy and digitalization) to contribute and participate in SWOT workshop which took place on 4th June 2019. In the workshop participants analysed in an open and interactive co-operation region´s strengths and weaknesses as well as opportunities for further development and threats to positive development in Kymenlaakso region in relation to 5 different predetermined scenarios. This work resulted in 5 different RIS3 related SWOTs.

These results were afterwards processed further and compiled into one SWOT synthesis by collecting strengths, weaknesses, opportunities and threaths into one template. Characteristic for Kymenlaakso region were e.g. forests and bioeconomy-based products (=S), structural change region and unfavourable population structure (=W), expertise in utilizing digitalisation and tourism (=O), weak/low competence base and outmigration to growth centers (=T).

KYMENLAAKSO REGION´S SWOT SYNTHESIS



From Cursor Oy´s and region´s point of view this exercise boosted the use of RIS3 strategy in a concrete way. The workshop gave an excellent opportunity to train predicting future scenarios, pinpoint specific development needs, develop strategic foresight thinking and intensify co-operation and interaction with region´s different innovation actors. This exercise showed regional strengths and opportunities and most importantly weaknesses and threats which need specific attention and building of new competence and collaboration. With this exersice it was possible to analyse what kind of competences should be fostered and developed internally and externally in order to manage in the future.

SWOT workshop and its findings was a good starting point and a boost for Kymenlaakso region to revisit its RIS3 strategy, review critically the validity of the strategy and assess the need of updating the RIS3 strategy (possible strategical change demands; needs to develop region´s innovation ecosystem) since Kymenlaakso region´s RIS3 strategy was compiled and documented already in early 2016.

As one of the results, Cursor Oy had 23.11.2018 together with Regional Council of Kymenlaakso a meeting where preliminary steps were discussed and planned on how to proceed with the process of updating region´s RIS3 strategy. Who to involve and how to ensure that relevant input from relevant innovation actors will be received? It was decided that during spring 2019 all three RIS3 expert working groups will be gathered together to a joint meeting to e.g. share views and experiences from past operations and activities.

Due to unexpected circumstances the meeting was finally rescheduled to take place in November 6th 2019. Invitees consisted of a varied group of representatives from Cursor Oy (six), South-Eastern Finland University of Applied Sciences (six), Kouvola Innovation Ltd. (=region´s other development company in the north; two), Kotka Maritime Research Center (one) and company representatives (two) plus representatives from Regional Council of Kymenlaakso (two).

It was envisaged that this would also be a starting meeting for the updating process of Kymenlaakso region´s RIS3 which was expected to start in November and last approximately six months until summer 2020. This updating process was planned to be a joint effort engaging region´s all relevant innovation actors including Cursor Oy as well. The process coordinator and orchestrator is the Regional Council of Kymenlaakso.

3. Stakeholders, Users, and Customers Identified

In Kymenlaakso the main stakeholders/ local actors of the local place-based innovation ecosystem are:

- Universities & research institutes: South-Eastern Finland University of Applied Sciences (Xamk), Kotka Maritime Research Centre
- Relevant companies (spearhead): Port of HaminaKotka, Empower Oy (regional forerunner in smart factory development), Finnhub Association (a national logistics company network).
- Public organizations, Regional Council of Kymenlaakso, the city of Kotka, Cursor Oy, Kouvola Innovation Ltd, Kymenlaakso Chamber of Commerce, entrepreneur organizations
- Civil society organizations (representing citizens/consumers): Kotka Youth Council.

South Kymenlaakso Vocational College and Kouvola Region Vocational College are also actively developing regional ecosystem especially via regional, national and international collaboration projects.

Planning of Finnish Innovation Camp including challenge formulation started in early 2019. Helsinki-Espoo-Kotka Innovation Camp on Sustainable Baltic Sea Region 2030 took place on 2nd-4th May 2019 in Otaniemi (Espoo) and in the City of Kotka. The camp was organized by Aalto University in cooperation with Cursor Oy.

The process of formulating challenge for the Kotka leg of the innovation camp was a special case which initially began because of Smart-up BSR project and Aalto University´s collaboration with University of Helsinki. One goal of the collaboration was to better include the topic of sustainable smart port to the project. In

connection to Smart-up BSR piloting and Finnish Innovation Camp, the Kymenlaakso region´s associated partner the city of Kotka/port of Kotka was given the opportunity to provide a real-life challenge for this collaboration where University of Helsinki´s students worked on different real-life problems/ themes of interest from the collaborator partners.

At first Cursor Oy had internal talks about possible camp challenge. After that external talks were held with the representatives of the city of Kotka. Finally, the real-life challenge from the city of Kotka representatives called "How to combine digitalization, sea and people into sustainable business opportunities in the developing Kotka Old Port area?" was delivered forward to student group to be worked on. The work continued during March 2019 with joint events with student groups and challenge owners/ partners. The final output of this collaboration was connected to Finnish Innovation Camp during Kotka leg of the innovation camp when the results of port related challenge was presented in Kotka to challenge owners/ the representatives of the City of Kotka and other camp participants. It was then envisaged that in the best case output of this work could provide our region´s innovation stakeholders new insights and ideas how to develop and orchestrate innovative activities in Kotka Old Port ecosystem.

When thinking of regional ecosystem´s role in supporting innovations, certain thing stands out strongly. Kymenlaakso region is geographically a relatively small area and all the relevant innovation actors know each other quite well. The communication and contacting between actors are smooth, fast and straightforward.

A joint working group of all actors has been set up in the region by Regional Council of Kymenlaakso to work on updating the RIS3 strategy. In the context of this, all the existing innovation services and resources as well as possibly lacking ones will be identified and described. This working group serves also as a joint platform for intensified cooperation on selected strategic spearheads/ areas (e.g. establishment of joint innovative projects).

In Kymenlaakso region one mechanism for engaging different stakeholders in the future is via RIS3 expert working groups work (one group dedicated to certain strategic RIS3 spearhead). These groups were set up in late 2016 simultaneously with the finalisation of RIS3 strategy process. The chairmanship and composition of the groups have changed several times after the initiation. This can be seen as a reflection of changes in the surrounding environment and a way to adapt to ecosystem´s changing needs.

4. Designed Activities and Offerings

As first steps relating to pilot action planning Aalto University gave guidelines on how to map the key stakeholders and projects in regions relating to four spearheads. Cursor Oy did this exercise of mapping regional stakeholders and scanning for

relevant existing regional initiatives and projects which could be taken up as best practices or to be linked to piloting and experimentation for Smart-up BSR three times. The latter mapping exercise was done as a homework for Tallinn Innovation Camp which was held on 16th-19th September 2019. From Kymenlaakso´s perspective the most promising priority topic for the pilots was Smart City.

The Tallinn Innovation camp focused on the methodology of pilot planning and planning of pilots. During the camp Aalto team organized a discussion with partners concerning the methodology for pilot planning.Partners, including Cursor Oy, presented their first steps for pilot planning (stakeholder mapping and scanning for relevant projects and initiatives). Discussions also addressed i.a. the style of the guidelines for designing the methodology. As a result, it was agreed to compile a concise guideline for pilot planning methodology.

Aalto team compiled a 2-page document with methodological guidelines for pilot planning and all partners were given the opportunity to comment it. Planning of pilots continued after Tallinn camp and each partner was requested to deliver a preliminary Pilot Action Plan and main outputs. For Cursor and Kymenlaakso region possible pilots could address the development of Kotka port area and/or "e-Kotka" (development of digital services/ solutions for people). These two were chosen because they were already existing regional initiatives which can be connected to cross-regional/EU level projects for building up synergies and increasing impact.

Finally, from Kymenlaakso´s perspective a broader theme of Smart City/ smart port was seen as the most promising priority topic for piloting

Lessons learnt from previous innovation camps especially held in Aarhus/ Denmark, Klaipeda/ Lithuania and Gdansk/ Poland have been inspiring and useful in visualizing and picturing what kind of structures, operations and activities could be included in port area-related development processes in Kotka-Hamina region and what could be exploited for Kotka leg of Finnish innovation camp challenge creation as well.

In Kymenlaakso, in the city of Kotka, a Kotka Old Port area regeneration project is a huge ongoing effort which takes a lot of time, resources and substantial investments. The overarching vision is to transform a brownfield area situated on the seaside and in the city centre to a mixed-use area in a sustainable manner. The whole area will be built and converted into a modern centre where business, university of applied sciences, development company, citizens, authorities etc. EDP actors are brought together to interact with each other. The aim is to create a vibrant innovation ecosystem which engages different stakeholder groups to cooperate, boosts start-up culture and creates competitive edge based on region´s strengths and opportunities that are available regionally and inter-regionally (especially in the Baltic Sea Region).

The aim is that region´s innovation actors will benefit from novel synergies, have access to new networks, opportunities and cooperation which are enabled by favourable surroundings, conditions and processes created by this innovation ecosystem.

The whole regeneration project consists of many different elements and projects. During winter in 2019 one activity relating to this bigger process and to Finnish Innovation Camp challenge formulation and implementation was executed together with Cursor Oy, project´s associated partner the city of Kotka, Aalto University and students of University of Helsinki. Smart-up BSR project was partnering with University of Helsinki to better include the topic of sustainable smart port to the project.

As a part of the Finnish Innovation Camp planning, challenge formulation and work with the challenge for the Kotka leg of the Finnish innovation camp was arranged aberrantly before the actual camp. The city of Kotka/port of Kotka was given the opportunity to provide a real-life challenge for above-mentioned collaboration where University of Helsinki´s students worked on different real-life problems/ themes of interest from the collaborator partners. This work of students was connected to Finnish Innovation Camp when work results for port related challenge was presented in Kotka to challenge owners/ the representatives of the city of Kotka and other camp participants during Kotka leg of the camp.

First Cursor Oy had internal talks about possible challenge and then external talks with the representative of the city of Kotka. Finally, the real-life challenge from the city of Kotka called "How to combine digitalization, sea and people into sustainable business opportunities in the developing Kotka Old Port area?" was formulated and delivered forwards to student group to be worked on. The work continued during March 2019 with joint events with student groups and challenge owners/ partners. The final output of the work was presented during the Kotka leg of the Finnish Innovation Camp on Friday 3rd May 2019.

University of Helsinki´s students´ work Kotka Old Port Project- A Sustainable Hub by the Sea emphasised the improved accessibility of all the good parts in Kotka, the urban national park and the unique features of a city by the sea. The work presented several concrete ideas with which to enrich and enliven the port area with innovative sustainable entrepreneurship. The role of local entrepreneurship was emphasized because it can really shape the port area into a commercial form while giving the locals a chance to support their community and get goods produced nearby. This also supports the tourism business aspect. Sustainability was highlighted in all city planning and development. This could be realized e.g. via adaptive reuse of buildings/ warehouses which could give new purpose/ life to old buildings and provide space for new activities and business. From cultural and excitement point of view new events that get the attention of people and create good memories could be organized (pop-up events such as restaurant days, start-up activities, circular economy and collaborative consumption related functions).

As far as challenge owners (especially land use planning) were concerned, they were very interested in exploiting the work results in their future work. Unfortunately, there is currently no suitable ongoing project or plan through which to implement the Kotka Old Port Project idea presented by the students. The idea is though well remembered, and it has strong potential to be utilized via temporary use of the Port area. The development of the area is a multi-year process and e.g. the vacant warehouse buildings in the area offer opportunities for many activities.

The agenda of Kotka leg of the innovation camp tackled especially topics relating to port area and its development. In addition to the presentation of students from Helsinki University, Port of HaminaKotka presented their novel Gisgro Port Digital Twin Project demonstrating 3D model of the port areas for maintenance of the underwater and surface structures.

Port of HaminaKotka´s presentation of innovative 3D model was perceived as a possible case that could be utilised for cross-regional pilot planning i.e. introduced and piloted also in other partner regions. Initiatives were made during the rest of the Finnish innovation camp to matchmake interested parties from e.g. Poland and Lithuania with Port of HaminaKotka representatives.

5. Value Network Engaged

From Kymenlaakso´s perspective a broader theme of Smart City was seen as the most promising priority topic for piloting like it is for the City of Tallinn, City of Aarhus, University of Latvia and ITMO as well. It was envisaged that the Smart City theme is a promising basis for cross-regional pilots which could combine Smart-up partners together. The development of smart ports as a sub-theme is also closely related to Smart City theme. Project´s port cities (Tallinn, Aarhus, Klaipeda, Gdansk, Kotka, Stockholm and Helsinki) are interested in this initiative within the Smart City theme.

From Kymenlaakso´s point of view lacking regional competences could be complemented with collaborating especially with project partners from port cities. Benefits received from new partnerships could

6. Ecosystem Orchestration Arranged

One noticeable thing is that the city of Kotka has taken even more active role as an enabler in regional ecosystem. The city has been an orchestrator for innovative projects and a co-creator and tester of innovations. Some of the activities have been inspired by Smart-up BSR project. In Kymenlaakso region an excellent example of a city being an enabler is Kotka Old Port regeneration project which was tied up with the planning and execution of Finnish Innovation Camp.

LATVIA – Ministry of Education and Science / University of Latvia

PILOT 1 : MINISTRY OF EDUCATION AND SCIENCE

1. **Importance of the Pilot**

As the MoES (Ministry of Education and Science) role is to foster innovative, wealthy and integrated society in which everyone has equal opportunities for development, our goal with this pilot was to make sure that RIS3 Strategy was implemented successfully, support partners and establish necessary amendments to existing RIS3 strategy and implementation plan by doing accurate monitoring. We were committed to facilitating dialogue with the stakeholders by sharing information and providing extensive explanation of the relevant policies, participating in all stages of decision making.

Smart-up BSR pilot allowed us to expand existing network with regional level stakeholders, but also to engage and support other Smart-up BSR partners from Latvia - the University of Latvia and the University of Liepaja in linking their pilot projects to the RIS3 national framework. Thus we paid more attention to directions like Smart cities (advanced IT) and circular economy (knowledge intensive bioeconomy).

Latvia envisioned economical but also social impact and outcomes from the project that would support implementation of the RIS3 national framework, for instance, better solutions for skills gap or better management of water resources or improved education and link between the university and the business community by sharing and interdisciplinary circular economy approach.

Latvia is progressing towards globally connected R&I system. Comparing to other EU countries, Latvia still have weak excellence track, with exceptions of some excellence islands. Still relatively weak links with industry. R&D systems are still passive and re-active in steering socio-economic impact. Therefore, the decision to engage with this pilot was to learn from others and work on new approaches where possible.

2. **Involvement and participation**

- Methods that were used to promote, advertise, recruit, create awareness

Support and discussions with universities, research centers, businesses other public bodies.

- Who was targeted specifically, how many were reached (eg SMEs in a specific area, citizens, …)

Triple Helix approach was tested and main target groups were R&D institutions, higher education institutions, entrepreneurs, municipalities and other ministries.

- Did participants/participating organizations apply to join the pilot? Application procedure? Selection procedure?

No. We proactively tried to communicate and collaborate with relevant stakeholders.

- Aspects considered for involvement, commitment required and commitment shown, time frame (short/long term?)

We tried to collaborate with all the stakeholders that were interested and had regional or sector specific knowledge, expertise or experiences helpful for RIS3 national strategy implementation monitoring.

- Who participated in the activities (e.g. professional roles, type of business, experience)

Universities, research centers, businesses, municipalities and other ministries.

3. Details of pilot activities

- Encounters and interventions

The MoES had numerous meetings with national and regional stakeholders (municipalities, ministries, scientific and research institutions, universities and businesses) to discuss aspects of circular economy, bio-economy, IT advancements, technology transfer and other new initiatives, programs and projects that can be used for national RIS3 strategy better implementation.

- Type of activities (participatory, training, testing, transforming, supporting, other)

Supporting University of Liepāja and University of Latvia in linking their pilot projects to the RIS3 national framework.

- Was cross-regional cooperation relevant, was such collaboration achieved

Cross-regional cooperation was very relevant to learn practices in other countries and regions, as well as to discuss further cooperation and new project opportunities.

4. Results

- Impact for home region

Major outcome of the pilot was to learn different practices around the Baltic sea in RIS3 planning and implementation, regional capacity building and also to establish new networks. For the MoES it is important because investment and policy focus at R&D is aimed towards international collaboration, competitiveness and excellence through technology and knowledge transfer and sufficient human capital in R&D. R&D capacity development in academic, scientific and business sectors to foster economic transformation is aligned with RIS3 priorities. Latvia aims for higher degree of international co-operation for improvement of position among EU innovators and actual impact of the research, as well as more successful cooperation in international project openings.

- Impact for BSR

Cooperation for new project applications (e.g. in circular economy sector) and networking, new contacts.

5. Learnings and outcomes

Sector specific information regularly needs to be updated and overlooked in at least regional context for better and more accurate focus and engagement with all the stakeholders (policy makers, R&D sector, entrepreneurs, students and general public), providing updates on challenges and opportunities.

6. Follow-up and future outlook

Currently the MoES is working on new policy planning document that will revise and update existing RIS3 strategy for next funding period. It is very likely that implementation of related activities will be changed accordingly.

- Summary of knowledge gained

The RIS3 strategy for Latvia has been already in the implementation phase, but will be adjusted later this year. With each innovation camp MoES experts gain new experience on how to tackle different aspects of RIS3 development and implementation, e.g. societal challenges in the region, ways on establishing dialogue between stakeholders, coordinating the bottom-up process, etc.

- Beneficiaries of the new knowledge gained

By participating in the innovation camps, the Smart-up project manager and RIS3 experts from the MoES gained insights and knowledge based on societal challenges that need to be considered when performing the monitoring of Latvian RIS3 strategy and implementation of related activities.

PILOT 2: THE HOUSE OF TECHNOLOGY (UNIVERSITY OF LATVIA)

The University of Latvia (UL) is the leading national most influential university in Latvia. It is also the largest university in Latvia and has important role in the development of the education system as well as the economics of Latvia.

The development of the UL Academic Centre started in 2004 with the endorsement of the University's "Development Strategy 2004-2010". Academic Centre Stage I implementation starts in 2012 with a tender for the best idea for development.

Stage I: includes the building of the house of Nature and successfully concludes it in September 2015.

Stage II: In 2016, continuing the development of the AC, UL launched cooperation with the EIB by submitting a Stage II project. Stage II includes the House of Sciences (completed in 2019) and the House of Letters (to be completed in 2023).

Stage III projects of the Academic centre development programme include such projects as:

- House of Health – an outpatient care, study and research complex, including the family doctors Competency Centre and the Sports Science Centre;
- House of Technologies – Life Science, Material Sciences and High Energy Radiation Technology Centre;
- House of Champions – sports complex, sports science and functional medical centre;
- House of Students and Guests – student dormitories and social support infrastructure, apartments for employees, guest lecturers and guest researchers.

The University of Latvia has chosen the House of Technology as the pilot project in the Smartup BSR project. House of Technology project represents a concept of the technology transfer centre fostering development of innovations from TRL 3-4 to 6-7; three main specialisation fields according UL smart specialisation directions (HEPC - radiation chemistry and physics; Materials, mechanics and prototyping centre; Life Science centre).

The House of Technology would serve as a pilot for the implementation of the features of smart city (smart energy supply and measurement, open data, smart lightning, smart mobility). Afterwards the concept is planned to multiply to other buildings of the campus and on the next level - to the market. The House of Technology and, in wider terms, the Academic Centre is intended as a pilot project ("city within city") that implements Smart City Guidelines

It was recognized that the technology centre has to be modular in order to be able to accommodate new directions and divest activities that turn out not to be successful. This concept came from working with the longlist of proposed equipment. In the same process a method for evaluating the potential of the proposed directions of research and proposed list of equipment was devised. This includes both the financial (returns, payback estimates) and non-financial criteria (market response, fit with strategies, synergies with other directions).

Thus, the concept is developed to be able to validate unnumbered different scientific directions/units and to prove their viability and marketability.

Importance of the project

The approach to the project was tightly related both to the road set forth by the regional (Latvia) RIS3 strategies on the one hand and to the specific needs and goals of involved stakeholders.

The S3 priorities of Latvia among others include:

- Knowledge based bioeconomy
- Biomedicine, medical technology
- Smart materials, technologies and engineering systems

- Information and communication technologies
- Smart energy

The House of Technologies addresses these by creating infrastructure and organisational platform for transfer of technologies. Also, in the case of Latvia Smart Specialisation strategy corresponds to a national research and innovation strategy for economic transformation.

The core criteria for allocation of public resources reflect the local policies and the public preferences. These criteria were considered as a basic validation of the direction envisaged by the House of Technologies. The criteria among others include:

- Growth of S&T human capital (knowledge and networks), expressed as increased
- competence of individuals engaged in projects and opportunities to increase multidisciplinary research and innovations and an increase in research capacity through university graduates;
- Scientific excellence, characterized by the level of usefulness of new knowledge for future or present economic and societal challenges;
- Net economic value or today's financial and social benefits that project will create.

As for the perspective of the owner of the initiative and the pilot of the House of Technology – the University of Latvia – the project was built to align with the strategic intents of the of University, which include:

- To improve the competitiveness within BSR region of the University of Latvia and its scientific institutes
- To increase the potential and governance of the intellectual property
- To increase the international reputation and ratings of the University of Latvia.

Stakeholders

A number of different groups of stakeholders were included in the development of the pilot. The scientist affiliated with the University of Latvia camp up with more than 150 different ideas suitable for the project.

Local and regional expert were employed to evaluate both the substance of the ideas and also the financial and commercial assumptions behind the proposed ideas.

A further challenge includes finding a way to coordinate various similar initiatives over the BSR with an aim to eliminate ineffective use of scientific equipment and allocation of resources. The concept of specialisation (and smart specialisation) could be seen as a way forward, so that each hub of technology transfer within region would be much aware of the general direction chosen by other players.

Designed activities

The Smartup BSR innovation camp held in Riga in February 2020 addressed several issues, the solutions of which were directly related to the pilot project of the House of Technologies.

- "Long-term cooperation between business, academia and public sector to foster innovation". The group challenged the Triple Helix -model based challenge setting by adding citizens to the challenge, just like theorized in the Quadruple Helix model. One of the key findings for how to keep the system running as smoothly and efficiently as possible is to increase TRUST between the different players.

- "Promoting the communication between the holders and users of the science infrastructure". Part of the challenge could be solved by developing new department in the universities which combine all the infrastructure, researcher contacts and is responsible for infrastructure usage, sharing, maintenance and services.

- "How to help the innovations to leave the scientific laboratories and interact with commercial sector and society." The challenge was specified, and three area of issues emerged: Motivation of scientists to attempt commercialisation of their innovations, organisational and physical infrastructure improvement, maximising the market. Surveying scientists for ideas (scouting technologies) was identified as the very first step. This would enable creating collaboration platforms, creating databases of research initiatives and investor requests, organising informal gatherings and ongoing expos of certain technology.

Value network engaged

Parallel to the Smartup BSR Innovation camp a conference "Innovation – power of the 21st century" was held. This resulted in signing of a "Riga declaration" which emphasizes the cooperation of the signing parties in the fields of 3S strategies, development of knowledge-based society and economy and cooperation in an innovation-friendly economic environment.

Based on the recommendations of the European Investment Bank regarding the need to create the Innovation Centre House of Technology within the University of Latvia Academic Centre as a regional innovation centre, and on the Riga declaration Latvia together with BSR partners should develop a targeted financial platform for development of innovations from TRL3-4 to TRL7.

The platform established by Riga declaration would help both for pooling financial resources and also creating networks of competencies, which is important for successful realisation of the House of Technologies.

Detailed pilot activities – encounters and interventions

The following activities in the House of Technology pilot project were carried out:

- The longlist of proposed research ideas and required equipment created
- Working on market research in order to determine supply/demand for research services, most optimal use of the equipment and required investment amount

- Series of meetings with the research personnel and external consultants to identify and analyse the research services: what are the underlying and associated costs, possible revenues streams
- With participation of external experts and consultants the feasibility study and funding model of the House of Technology has been prepared
- The strategic model for operating the House of Technology has been prepared (including the organisational structure within the structure of the University and the congruence with university's strategic goals);
- High level strategic outline of the commercialisation strategy (including the identification and protection of intellectual property rights) has been prepared

Results for the region and the BSR region

The pilot strategy of the House of Technologies has already had an impact on various levels, starting from the very local level of the University. There the preparation of the concept has work greatly both to structure the various diverse scientific ideas and initiatives. More than 150 different ideas were scrutinised, grouped and evaluated. Also the project itself has stimulated the scientific personnel to shift their perspective and accommodate the view of commercialisation of their scientific work.

On the country level and the level of the region the pilot project of the House of Technologies has had certain impetus on the process of technological commercialsiation and has been received as a role model on how to stimulate the transfer of technologies.

In general, it is expected that the House of Technologies would have an impact on the following indicators:

- New channels of income from research services, licencing of intellectual properties, increase competiveness of new project proposals, attraction of new scientific personnel
- Improved technology transfer by increasing the technology readiness level of inventions
- More innovations and inventions with higher value added
- Improved quality and quantity of scientific publications

Follow up/ future outlook

The next steps in the process of the development of the pilot include:

- Attracting finance
- Finding the right legal framework (protection of intellectual rights, commercialisation)
- Building, procuring equipment
- Business plan implementation and control

LITHUANIA – Smart city / Smart Port

Interreg Baltic Sea Region

EUROPEAN UNION

EUROPEAN REGIONAL DEVELOPMENT FUND

Smart-up BSR

LESSONS FROM SMART UP BSR PILOTS – REPORT

Smart Up BSR Pilot – Smart City – Smart Port

Pilot partners: Klaipeda Science and Technology Park & Agency for Science, Innovation and Technology

mita

KLAIPEDA SCIENCE AND TECHNOLOGY PARK

2020

Lithuania

A. IMPORTANCE OF THE PILOT

In 2014 Government of the Republic of Lithuania approved Smart Specialization strategic programme in which Lithuania, like other European Union countries, has set its R&D&I priorities, considering existing or potential competitive advantage. Priority directions for R&D&I were determined by analyzing the potential of business and research in Lithuania, including the human capital.

Klaipeda region has no separate RIS3 and it is a part of Lithuanian national RIS3, thus region always needs to ensure that its interests are reflected in the national strategy, which is also a framework document for governmental investments. It was important to find the way how the engagement of maritime value chain (policy makers scientists and investors of the region), could help to shape Lithuanian' RIS 3 to reach the consensus on the industry transformation priorities, channel the resources for strategy implementation. In addition, the maritime industry is diversified, so in order to lobby regional priorities the local policy makers have to reach a consensus about the regional priorities as well.

In the Initial S3 strategy transport sector and marine sector were not included as separate priority and, taking into consideration the importance and potential of the sector to Lithuania and Klaipeda in particular, Smart up BSR project partners (Klaipeda Science and technology park (KSTP) and Agency for Science, Innovation and Technology (MITA), decided to proceed with development of initiatives that might contribute to the development and visibility of this sector with the help of Smart up BSR project pilot activities.

Smart Up BSR partners in Lithuania – KSTP and MITA, compiled a list of stakeholders that could be relevant in the process of RIS3 planning and implementation. There were organized meetings with politicians, business and academy representatives and prepared SWOT analysis of Lithuania and Klaipėda region. It was agreed that the main strengths of the region concentrate on strategic location of Lithuania, well developed transport and logistic networks as well as Klaipeda Sea Port. Nevertheless, these strengths and potential that might be brought to the region, were not prioritized in the strategic documents. During the meetings stakeholders agreed to propose an additional priority, that in the updated version of the Programme on the Implementation of the Priority Areas of Research and (Socio-Cultural) Development and Innovation (Smart Specialization) and their Priorities would concentrate on "*Smart, Green and Integrated Transport".*

By implementing project Smart Up BSR activities partners from Lithuania agreed to concentrate efforts to include the priority of transport to the Smart Specialization Programme and implement a Pilot in Smart City theme "Smart Port" as a case to show how much potential there is in this sector, how many goals can Lithuania achieve by investing and developing smart transport sector. Regional stakeholders have a potential to become "challenge owners", they have deep knowledge about the context and complexity of the challenge and take a lead towards finding the solutions. This is why it was very useful to

have a discussion together with Klaipėda sea Port authority, representatives from Klaipėda municipality and Klaipėda region municipalities about Klaipėda region and Lithuania's strengths, possibilities, weaknesses and threats. This analysis let Klaipeda region to gain better understanding on how the region positions itself among other BSR countries and to prepare certain challenges, case studies, that needed international experience and best practices that could be provided by using Smart up BSR project network.

Discussions, organized during 2018 - 2019 were focusing around many different notions, such as autonomous ships, fully automated ports, digitized shipping information and documentation, automatic monitoring of vessels and equipment, etc., led to identification of the main questions for Smart up BSR mini Innovation camp in Lithuania, Palanga: *How can a smart city connect and support a smart region?*

In the approach to the Smart Cities mission, the objective is to promote cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of 'Smart' Solutions. The challenge in the digitalization and automation of the Maritime industry is hidden in the scale. At the time EU is still leading the Maritime development globally, the challenge for regions like Klaipeda is to find the way to benefit on being frontrunners in the application of the technologies, gaining enough knowledge and capacity to transform local Maritime industries to a higher added value products and services. Knowing that digitization and automation, that is crucial part in the development of maritime technologies, have recently become a hot topic among companies and organizations in the global maritime supply chain, it was also important to have support/legacy from different stakeholders who were involved in discussions. Active involvement of Klaipeda Port authority in the process was very important and promising, as this organization also is taking ownership of the challenge and seeks for the solutions. Companies, related to Port industries, have to grow from port cargo handling companies to innovative equipment producer, shipyards stepping into the autonomous shipping technology suppliers, etc.

Klaipeda region brought forward the regional challenge to become a competitive and sustainable port – an important part of Lithuanian national economy:

- How to flexibly transform local maritime industries in tune with global digitization and automation trends?
- How to find its own niche and competitive advantage?
- How to reach stakeholder consensus locally and lobby on a national level?

The Mini-Camp was held on 13-14 June 2018 started with a visit to Western Baltija Shipyard to get insights on maritime industry development at Klaipeda region.

The working group on Klaipeda regional challenge outlined the importance of joining different key actors to promote and work with the maritime industry. This should help to have a critical mass to get the maritime industry on the national smart specialization strategy. The working group developed a roadmap for linking maritime industry to RIS3 priority areas:

1.Finding key players;

2.Preparing pitches for industries connected with maritime;

3.Business cases;

4.Clustering;

5.Changing mindsets: e.g. by shock therapy – what if Lithuania had NO maritime industry?

This developed roadmap, as well as huge experience of participants and experts, who attended in this Innovation camp provided to Lithuanian partners a start to implement pilot activities.

After scanning of existing initiatives and ideas, elaborated during Mini Innovation Camp in Palanga, projects that might bring synergy and larger impact as well as identify the steps for achieving bigger impact in the region, it was decided to initiate Smart City – Smart Port pilot project, that would:

i) generate ideas and prototypes that could be adapted in developing smart transport ecosystems and in the logistics sector through automation and digitalization of port terminal facilities, safety and various processes;

ii) increase port efficiency and do impact for port environment regarding SDG;

iii) promote autonomous port vision by increasing digitalization and automation processes in Klaipeda port and among all port terminals, stakeholders and companies in BSR;

iv) encourage the creation of teams of innovators, who are interested in the newest technologies, that could be used to ensure the safety of the Ports and might be applied in Naval Forces.

KSTP and MITA promote business and science cooperation, commercialization of research and aim to stimulate applied research, technological development and innovation in Lithuania. One of the instruments to achieve these goals is organizing various events, that create conditions for and strengthen cooperation between public and private sectors. New solutions in digitalization, automatization and smart transport ecosystems, safety are very important for all BSR ports. So, Lithuanian partners agreed that Pilot for Smart city – Smart Port will consist of three different events:

1. LNG forum 2019. This event was organized on 15-16 May, 2019 Klaipėda, Lithuania.

Partners: Lithuanian LNG cluster, KSTP, JSC Klaipėdos Nafta (KN), Embassy of the Kingdom of the Netherlands in Lithuania.

Representatives from Poland, Sweden, Germany, Belgium, Norway, Denmark, the Netherlands and Lithuania.

Goal: to present and share experience about new, innovative technologies and services that are developed in BSR and provide a full overview of the LNG application and perspectives, ranging from LNG road and railway transport to the maritime and inland waterway sector. Sustainable LNG and liquefied biogas (LBG) infrastructure development.

Statistics: 200 participants, 8 countries, 26 speakers.

2. Portathon Baltic 2019. Pilot project of Smart up BSR, that was very successful event, that gathered many parts of smart maritime innovation ecosystem together and contributed to development of concrete solutions, took place on 20-22 September, 2019 Klaipėda, Lithuania.

Partners: Lithuanian LNG cluster, Klaipėda Science and Technology Park (KSTP), Gdansk-Gdynia-Sopot Metropolitan Area, Agency for Science, Innovation and Technology (MITA), Klaipeda State Seaport Authority.

Representatives from Sweden, Germany, Netherlands and Lithuania.

Goal: to generate ideas and prototypes that could be adapted in developing smart transport ecosystems and in the logistics sector through automation and digitalization of port terminal facilities and various processes; to increase port efficiency and do impact for port environment regarding SDG.

Statistics: 80 participants, 4 countries, 12 mentors, 18 teams and solutions.

3. Delta Navy – Military Tech Hackathon. Another Pilot project that concentrates on encouragement of citizens and other stakeholders of local-based ecosystem to take active role in the development of

new technologies, related to safety and security, took place on 25-27 October, 2019 Klaipėda, Lithuania.

Partners: Lithuanian Naval Force; MITA, Ministry of National Defense, Enterprise Lithuania, Kaunas University of Technology, Klaipeda University, Vilnius Gediminas Technical University, Baltic Tech Park, Klaipeda Science and Technology Park.

Goal: to generate ideas and prototypes that could be adapted in the Navy; to encourage the development of advanced products that require the highest military requirements; to bring people from different fields for the same purpose - to strengthen the Navy and development of solutions, that might be used for civil purposes of safety and security.

Considering the specific maritime smart city topic, Delta Navy Hackathon was held in a Lithuanian Naval Force headquarters and supply ship "Jotvingis".

Statistics: 50 participants, 26 mentors, 11 teams and solutions.

B. INVOLVEMENT AND PARTICIPATION PROCESSES

The Pilot's main task is to analyze the current situation of ports, their challenges, the technologies applied in the port and generate ideas, prototypes, solutions for port digitization and automation processes with the help of target groups. Activities of the Pilot project helped to create network of maritime innovators as well as to develop unique solutions for maritime cities/regions that can be used not only in Ports and companies who operate in port, for universities to establish new pragmas, also Naval Forces and for civil needs.

In order to achieve the right and targeted audience in the events, there was engaged wide network of Smart UP BSR partners. The invitations to the events were also spread through BSR Port authorities and other interested parties. Smart Port pilot received huge interest and pilot organizers managed to gather a wide network of associated partners for each planned pilot event: JSC Klaipėdos Nafta (KN), Embassy of the Kingdom of the Netherlands in Lithuania, Lithuanian LNG cluster, Klaipeda State Seaport Authority, Lithuanian Naval Force, Ministry of National Defence, Enterprise Lithuania, Kaunas University of Technology, Klaipeda University, Vilnius Gediminas Technical University, Baltic Tech Park.

Smart Port pilot events were open for all who were interested in generating new ideas, have a solution on how to solve challenges, looking for new contacts and networks, and etc. Through created registration link there were received registrations from various countries, not only from BSR region – this showed us that our set challenges are important also internationally. The Pilot events attracted participants from Poland, Sweden, Germany, Belgium, Norway, Denmark, Netherlands. There were representatives from Port authorities, Clusters, International companies, startups, new technology providers, students and scientists. We, as Pilot organizers, were happy that we attracted representatives of international companies to participate in this pilot as an experts and as mentors as well.

To implement The Pilot activities Lithuanian partners organized meetings with regional stakeholders, cluster representatives, universities and other projects partners.

Due to the sensitivity of the field of an application, Delta Navy Hackathon organizers had to organize the selection of potential participants. There were organized two steps selection procedure:

1. Registration and selection of applicants, that met set requirements;

2. Selected participants were invited to visit the Naval Force ship “Jotvingis” to form teams, to get acquainted with tasks and be better prepared to accomplish them.

C. DETAILED PILOT ACTIVITIES

Partners in Lithuania agreed that the first Pilot event will be Forum and other events will be divided into different themes and will be more interactive and for that it was decided to have a hackathon format.

Forum format was useful for all participants to present their activities, in what stage are BSR region ports, to meet people from different countries with different experiences. At the Forum (20-22 of September, 2019) we got 200 participants from 8 countries and 26 speakers.

Organizing Hackathons is one of the new forms of encouragement of such cooperation, and it became a very popular and effective way to bring all interested parties in

one place to find needed solutions. Partners in Lithuania wanted to apply this form of events (hackathon) for the Smart city sector with the focus on the development of solutions, prototypes related to autonomous port, digitalization and automation processes, safety and living standards of the population in the Port area.

"Portathon Baltic 2019" (20-22 September, 2019) brought together professionals and technology enthusiasts of different competencies in the environment open to creativity in order to generate ideas and prototypes applicable in the logistics sector by automating and digitalizing port terminal equipment and various processes as well as developing smart transport ecosystems. The challenge was accepted by 80 participants from 4 countries – Lithuania, Netherlands, Sweden and Germany.

Delta Navy Hackathon (25-27 October, 2019) was very successful, attracted more than 80 participants and created a list of very competitive solutions, that got attention from investors, who participated in the event.

With involvement of main stakeholders of maritime ecosystem, IT/engineering field qualified citizens, it was taken an advantage of innovations to improve safety and living standard of the population by creating the following solutions:

- Personnel monitoring system;
- Laser communication;
- Search/environmental analysis drone (sea launch).

During Delta Navy Hackathon the groups were responding to the challenges in real time, presenting scientifically based solutions, that might be adopted in the practice in the nearest future.

The first prise at Delta Navy Hackathon was assigned to the team „VGTU-AGAI2", that created unique solutions for laser-based communication system, that might be used for communication between the ships in cases where radio connection is not possible or forbidden. These solutions are highly applicable for the use of safety and security in port areas. Involvement of scientists and specialists from different fields in the creation of new products for Smart ports is very important part of efficient functioning of innovation ecosystem as well.

D. RESULTS

- Impact for home region

Implementation of pilot projects, stakeholder engagement and diverse operational activities in the region are the key factors in moving the smart specialization approach to the center of the regional transformation processes. Active engagement of target groups and ecosystem stakeholders in the activities organized is essential for the success of implementing smart specialization policies. Numbers of participants in the events shows motivation and commitment, that are also key facets of the mindset, needed to elaborate this process.

The process of pilot projects implementation brought many important achievements:

On the basis of the interim evaluation there was prepared updated version of The Programme on the Implementation of the Priority Areas of Research and (Socio-Cultural) Development and Innovation (Smart Specialization) and their Priorities, that was approved on the 24th of July, 2019 by the Resolution of the Government of the Republic of Lithuania No 760. Due to the efforts of stakeholders and key players to show potential of smart and integrated transport activities, the separate priority for Smart, Green and Integrated Transport, was included in the updated version of the Programme.

Pilot activities also increased awareness of regional representatives from private and public sectors as well as citizens, about what does it mean to be the part of place-baced innovation ecosystem and smart specialization process. It also increased their understanding of the benefits of actual participation and raised the level of motivation for taking active and constructive steps in the processes.

Pilot activities provided also very practical experience and skills on how to organize events, engage different stakeholders, find various challenge angles that would motivate participants to take active role in the processes.

Pilot projects enhanced commitment, helped to build new skills and competencies for organizers and co-organizers of events -KSTP and MITA. Both institutions gained competencies in many different areas: use of new innovative tools (Hackathons) and ecosystem thinking for encouragement of emerging place-based ecosystem, transnational cooperation and open innovation processes, mindset of experimentation and change management instruments to assure the transfer of best practices into activities implemented. Project pilot activities also helped KSTP to increase their role as key player, uniting stakeholders of maritime sector in the region.

Impact for BSR region

Activities of the Pilot project helped to create a network of maritime innovators as well as to develop unique solutions for maritime cities/regions. This directly related to the implementation of RIS3 in the region. Appearance of new solutions for autonomous ports, safety and security strengthens the competitiveness of the Region and contributes to the Ports cities of whole BSR.

The range of solutions provided by the teams at the “Portahnon Baltic 2019” was extremely wide – autonomous electric ferry, mobile application for the management of truck terminal, underwater drone, inland container barges reservation system, joint service and resource acquisition system, a mathematical model for more efficient organization of work in ports, technical solution for dust removal when handling bulk cargoes, and a robot for measuring and analyzing potential pollution.

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All these solutions, elaborated during hackathons have potential to become internationally attractive products, that might be applied in other Ports of Baltic See and so to contribute to more environmentally friendly, safe and innovative BSR.

Smart up BSR project created active network of experts from three Baltic ports: Klaipeda, Kotka and Gdansk-Sopot-Gdynia, who were sharing their knowledge and insights about possible solutions to existing challenges, ways to encourage emerging of innovative ecosystem in the Ports. Active cooperation between Smart up BSR project partners, openness and sharing of knowledge about innovative solutions, elaborated in the pilot actions, might be implemented internationally and could lead to the development of Smart ports network in whole Baltic See region.

E. PERSPECTIVES OF OUTCOMES

All pilot projects were good examples that helped to test existing innovation ecosystem: starting initiation of events, testing of networks and cooperation between different stakeholders, response of science and business people, legal framework as well as financing instruments, that might be offered for the teams in all stages of product development.

The main lessons learned from the piloting actions concentrate on:

- the need for more focus on experimental development and innovation;
- closer networking with mentors, experts;
- improvement of financial motivation system for R&D&I activities and appearance of funding possibilities for attracting of professional mentors/ experts to work with the teams.

The pilot showed that for many innovative companies, working on international level for many companies still is some kind of challenge and many companies are still not prepared to take advantages of emerging opportunities. Even if all logistics to participate in the events were organized and free of charge, public authorities put a lot of efforts to advertise and promote pilot events (e.g.Portathon 2019), still many participants from neighboring countries have not succeeded to take part in this event.

At the same time, it was very useful to hear two different opinions from quite big international companies about experiences gained during participation in pilot activities. They took part in the Pilot very actively and we, as organizers received very positive feedback about how it was useful to work in teams with peoples from different fields. In one team there were

students, scientists and business representatives. But at the same time there was a reflection from some companies about the reasons to refuse participation in the events. There are still a lot of fear to share own ideas and to participate in the brainstorming and creation of new prototypes.

F. FOLLOW-UP AND FUTURE OUTLOOK

The Smart City – Smart Port Pilot was useful for Klaipeda Sea Port authority and Klaipeda region. By implementing the Pilot, all parties – science, business and municipality could exchange their vision of smart port. Klaipeda Port authority identified their advantages and weaknesses comparing with other BSR ports. Klaipeda region accepted the main goal of the Port to become autonomous port.

Pilot activities facilitated increase of certain knowledge among KSTP and MITA. Representatives from MITA gained very interesting knowledge and experiences how to co-organize and take active part (as mentors and experts) in hackathons, encourage building of quite unique innovation ecosystem in quite closed and specific navy sector, evaluating possibilities to adopt new solutions, proposed by the winners of Delta Navy Hackathon to Port and Smart City areas.

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One of indirect results from Smart up BSR project pilot activities is increase of visibility of Maritime sector among RIS3 stakeholders and inclusion of additional priority “Smart, Green and Integrated Transport“ in updated version of the Programme on the Implementation of the Priority Areas of Research and (Socio-Cultural) Development and Innovation (Smart Specialization). Now actors of Klaipeda region innovation ecosystem have to take an advantage that occurred in the strategic documents and take initiative to boost the sector and make Klaipeda – frontrunner of smart Ports.

POLAND – Smart-Port - Gdańsk-Gdynia-Sopot Metropolitan Area

In collaboration with Lithuania (MITA and KMTP)

- **What change management methods were used?**

Hackathon is a meeting during which students and developers (programmers, testers, UXers and other specialists) come up with products and then build their prototypes or even the first working versions. Such a meeting is informal, usually quite intense and usually lasts from one to two days, although sometimes longer.

The hackathon has a certain structure: after the introduction to the challenges, work on solutions begins, building teams, finding mentors. The first ideas exchange takes place in the middle. At the end of the event, the results of the work are presented (usually working software) and the best projects are selected.

Hackathons are organized by communities and groups, and can be dedicated to a specific topic (here it was a Portathon - meaning working on solutions for sea ports) or technology.

- **How does the pilot advance internationalisation, open innovation, new ways of learning, interdisciplinarity?**

During Hackathons, in a short time, an external group of specialists from various fields can create a number of interesting and ready-to-implement ideas. Hackathon is a place where participants can practice or acquire new skills, gain experience in new tools and technologies that they can use in their future projects. During the Hackathon, it is possible to create innovation by using the so-called wisdom of the crowd and the recruitment of the best talent in the market, and the participation of appropriate mentors. During Portathon Baltic, we managed to gather an international group of interesting mentors who were available throughout the weekend to advise the teams.

In such a complicated topic as maritime transport and seaport management, introducing innovative solutions is not an easy task. The idea of organizing an international Port Hackathon was therefore the right answer to how we can jointly reflect in the Baltic Sea region on the challenges which seaports are facing. Thanks to Portathon Baltic, it was possible to bring together specialists and international teams to work together on solutions for the Port of Klaipeda and Gdynia. Introductory lectures at Portathon Baltic from Klaipeda, Gdynia and Hamburg also gave the participants an impulse to work on new technological solutions.

- **How does the region integrate learnings in the regional ecosystem**

  Activating business – academia cooperation is still a challenge. Certainly, in the future, it will be worth striving to build a larger environment around logistics and maritime innovation. We can see that we currently do not have a sufficient number of young innovators who would like to specialize in this topic. However, for a large port metropolis - sea ports, their development and better cooperation between cities and ports is extremely important. We believe that smart-port Hackathons are a great idea for developing such a community.

- **What makes more entrepreneurial?**

  The attitude called 'Respect for failure' shows young entrepreneurs the proper way to develop business regardless of numbers of times of going bust. Revival and positive attitude is a natural thing for an entrepreneur in the market economy.

Preparation from the perspective of Gdańsk-Gdynia-Sopot Metropolitan Area

Importance of the pilot for the region

The Gdansk-Gdynia-Sopot metropolis is the largest urban agglomeration on the Baltic Sea in Poland. There are two large seaports - one is located in Gdynia and the other in Gdańsk. The development of seaports undoubtedly contributed to the development of both cities. Maritime economy is one of the key industries in the Pomorskie region. Maritime and logistics is also one of the Pomorskie Smart Specializations.

During one of the Innovation Camps, we came to a common conclusion with Klaipeda that we could try to organize two Hackathons on the smart-port theme. One was organized in Klaipeda in September 2019. In Gdansk the Hackathon was planned for June 2020, but due to the COVID 19 situation the event was cancelled. Finally, in July 2020, the Lithuanian team proposed to organize a joint Hackathon, called Portathon Baltic 2020.

Involvement and participation

The event will be physically located in Klaipeda, but due to the COVID/19 situation, it will also be possible to access the event via an on-line platform, which significantly opens this event to participants from outside Poland or Lithuania.

From Gdansk it will be a fully on-line option for the mentors and participants. Registration for the Portathon is open to all the BSR partners. Partners of the event are two sea ports (the Port of Klaipeda and the Port of Gdynia). Portathon is an event dedicated to companies, individual start-ups, specialists, engineering students and IT students. Ports, port companies and other organisations are invited to offer their challenges to the organisers which will determine the solutions invented and developed by the participants.

Pilot activities

As a metropolitan association of the Gdansk-Gdynia-Sopot metropolis we engaged the Gdansk Business Incubator as a coordinator of the Gdansk part of the event. Gdansk Business Incubator is responsible for the Pomorskie Smart Specialization in the subject of maritime and logistics, as well as cooperating for a long time in the ecosystem of start-ups and entrepreneurship development in our metropolis.

Cross-regional activities are regular. Together with the Klaipeda Technology Park (KMTP) and MITA, we meet recurrently on an on-line formula to organize the next steps bringing us closer to the event.

Results

Organizing the event at an international level, as well as facing the new challenge, which is to organize a fully online Hackathon, will certainly result in acquiring new competences. Having been able to organise such a unique event and cross-regional collaboration completely on-line and virtually, this will give the team and the co-operating stakeholders the skills and competence to make use of virtual collaboration possibilities in the future.

Summary and future steps

The joint organization of the Hackathon is a port subject which is important for the entire BSR. It will be a great culmination of several years of working on the Smart-up BSR project via Innovation Camps and building the Baltic Sea Region innovation ecosystem. Most importantly, the lessons and skills learned as well as the cross-regional contacts will carry on into new future activities.

I. Smart City Agenda in St.Petersburg

I.1. The notion of "smart city" in local, regional and federal levels

At the federal, regional and city levels in Russia there are various approaches to the definition of the concept of "smart city", and these definitions differ among representatives of government agencies and businesses.

At the federal level, the Digital Economy Standard has been adopted, where the concept of "smart city" is defined as improving the quality of city management and the standard of living in cities through the introduction of advanced digital and engineering solutions.

In 2018 the Ministry of Construction of the Russian Federation launched the departmental project on digitization of the urban household entitled "Smart City". The project is part of the national Housing and Urban Environment project and the Digital Economy national program and is financed from them[32]. The federal "Smart City" project is aimed at increasing the competitiveness of Russian cities, creating an effective urban management system, creating safe and comfortable living conditions for citizens[33]. It is based on 5 key principles:

- human orientation;
- urban infrastructure manufacturability;
- improving the quality of urban resource management;
- comfortable and safe environment;
- focus on economic efficiency, including the service component of the urban environment.

The main tool for implementing these principles is the widespread adoption of advanced digital and engineering solutions in urban and municipal infrastructure. The Smart City goal is not only to digitally transform and automate processes, but also to comprehensively improve the efficiency of urban infrastructure.

Some elements of smart cities appeared in Russia much earlier since the mid-2000s. Therefore, the national project "Smart City" is not being created from scratch. At least four cities - Moscow[34], St. Petersburg, Kazan[35] and Tyumen[36] - began their smart city projects long

[32] Order of the Ministry of Construction of Russian Federation Order No. 695/pr d. 2018-10-31 "On approving the passport of the departmental urbanization digitization project "Smart city". Accessed at: https://russiasmartcity.ru/uploads/attachments/c6eff680-08dc-4d26-8323-40c5629f14fb/bfe3821963d69e26c6b6276d5abb6498.pdf.

[33] https://russiasmartcity.ru/about.

[34] https://www.smartmsk.com/aboutus

[35] https://rt.rbc.ru/tatarstan/18/12/2018/5c17a40e9a794747cee87c1e

[36] https://smartcity.tyuiu.ru/?page_id=2

before the advent of the all-Russian concept. As will be shown below, these cities rate the highest in the Cities' IQ Index.

The main stakeholders of the federal "Smart City" project besides the Ministry of Construction are the Ministry of Telecommunications, Digital Development and Mass Communications, companies-monopolists PJSC Rostelecom, governmental corporations Rosatom and Rostekh, and a newly established National Competence Center for Smart City (NCCSC). The working group of the project is a bit wider in terms of spheres represented and includes around 30 people - representatives of companies working in IT, mobile communications, energy and natural resources consumption, representatives of bodies of executive power and a minor share - people representing science (namely two university rectors).[37] NCCSC is responsible for the development, implementation and popularization of technologies, equipment, programs aimed at increasing the digitalization of the urban economy, and also the preparation and provision of assistance to international cooperation projects on housing policy, urban development and natural resources management, primarily related to the creation and functioning of "smart cities".[38] NCCSC has elaborated the draft Smart City Standard[39] and runs a bank of "smart solutions" on the project website https://russiasmartcity.ru. Today this bank presents 537 cities, 364 projects, and 18 experts.

To run the national "Smart City" project and to evaluate the situation with the present "smartness" of Russian cities the Ministry of Construction has launched a new national index - Cities' IQ. The index evaluates 10 areas of the city ecosystem (urban management, smart utilities, urban environment innovations, smart transport, intelligent systems of public and environmental safety, tourism and service, intelligent social services, economic status and investment climate, communications network infrastructure) and contains 47 indicators in total. In 2018 the index has been applied to 191 cities with a population over 100 thousand people (administrative regional centers) and pilot cities with population less than 100 thousand people which participated in the project on their own initiative. These numbers were taken as a baseline for the year of 2019 to measure effectiveness of the smart solutions implemented by Russian cities under the "Smart City" project. An important indicator of effectiveness is not the meaning of the index itself, but its dynamics through years.

The index methodology divides all of the cities into 4 groups by population: 15 largest cities over 1 million citizens, 63 large cities from 250 thousands up to 1 million citizens, 93 big cities from 100 to 150 thousand citizens and 20 moderate cities with population less than 100 thousand people. Other cities are pilot cities - administrative centers and others, 84 in total.

[37] Order of the Ministry of Construction of Russian Federation, January 17, 2019 No. 18/pr "On the creation of a working group of the Ministry of Construction and Housing and Communal Services of the Russian Federation on the launch and implementation of the departmental project for Digitalization of Urban Economy" Smart City ". Accessed at: https://russiasmartcity.ru/uploads/attachments/60e4fc76-9ae2-4c75-aaba-258966910e77/dfd44325fe5753c979c1f1debc31085d.pdf

[38] https://www.minstroyrf.ru/trades/gorodskaya-sreda/proekt-tsifrovizatsii-gorodskogo-khozyaystva-umnyy-gorod/.

[39] https://www.minstroyrf.ru/docs/17709/

The index for each city is calculated as a sum of ten indicators (subindexes). When rationing, a scale of 1 to 12 was applied[40]. The first three cities in each group are:

I. The largest cities: 1. Moscow – 81,19 2. Kazan' – 52, 58 3. St. Petersburg – 50, 37.

II.The large cities: 1. Khimki – 66,32 2. Balashikha – 59,38 3. Tyumen – 58,31.

III. The big cities: 1. Reutov – 71,35 2. Serpukhov – 63,5 3. Electrostal – 61,88.

IV. Administrative centers and pilots: 1. Dubna – 72,48 2. Ivanteevka – 62,18 3. Naro-Fominsk – 41,02.

I.2. The main priorities in developing a smart city in St.Petersburg

In St.Petersburg the smart city "construction" began at the end of 2016, although some elements, such as a safe city, a single document center, etc. were developed much earlier[41]. The project was officially launched in 2017, when the city administration (government) entered into an agreement with ITMO University (science and citizens) to jointly create the development concept within the framework of the "smart city" paradigm. Together they have launched the Smart Saint-Petersburg Project Office inviting entrepreneurs from different areas and scales of business spheres to solve the problems of a smart city in an open discussion. The final Concept of Smart St. Petersburg was approved by the former city governor Georgy Poltavchenko in April 2017. The Smart Saint-Petersburg Draft Priority Program by Project Office based on the concept (still remains on a draft stage)[42].

The Smart Saint-Petersburg Concept sets the main goal of "smart city" as ensuring the high perceived quality of urban life. According to the authors of the concept, the "smart city" paradigm embraces the idea of saving resources, creating high-quality urban environments and ensuring a high quality of life for the population through effective management of urban processes in combination with the open interaction of all stakeholders (citizens, business, government, and others) [Mityagin et al 2019: 18-19][43].

The Smart Saint-Petersburg follows 6 key principles.

1. The principle of creating a comfortable urban environment for everyone. This principle suggests that the urban environment will provide the needs and expectations of all population groups. Defines a universal method for assessing the quality of the urban environment as the ability of a city to satisfy the objective and subjective expectations of a city dweller.

[40] The description of the "Cities' IQ" index is accessed at: https://www.minstroyrf.ru/press/minstroy-rossii-predstavil-pervyy-indeks-iq-gorodov-/

[41] https://www.gov.spb.ru/press/governor/110988/

[42] https://www.gov.spb.ru/press/governor/138307/

[43] Mityagin, S., Karsakov, A., Bukhanovsky, A., Vasiliev, V. (2019) Smart St. Petersburg: an integrated approach to the implementation of information technologies for megalopolis management // Control Engineering Россия. 79 (1). *(In Russian)*. Accessed at: https://controlengrussia.com/otraslevye-resheniya/zhkh/umnyj-sankt-peterburg/

2. The principle of coordination and interaction of all participants in the development of the city. This principle suggests the need to attract all categories of stakeholders in the process of creating and using a “smart city”.

3. The principle of the additional purpose of urban infrastructure. This principle implies the priority of endowing existing elements of the urban infrastructure with new functions and thereby obtaining new results.

4. The principle of sustainable development based on monitoring, analysis and forecasting. This principle involves a comprehensive digital description of the city as a holistic system and monitoring of its condition for solving the problems of assessing, analyzing and forecasting the city development.

5. The principle of creating a digital environment for self-organization of residents and businesses. This principle involves the creation of a holistic information space of the city for the population and business and the opening of city data.

6. The principle of "Smart City" is a city where happy people live. This principle suggests a priority orientation on creating positive motivations of residents from interacting with the urban environment[44].

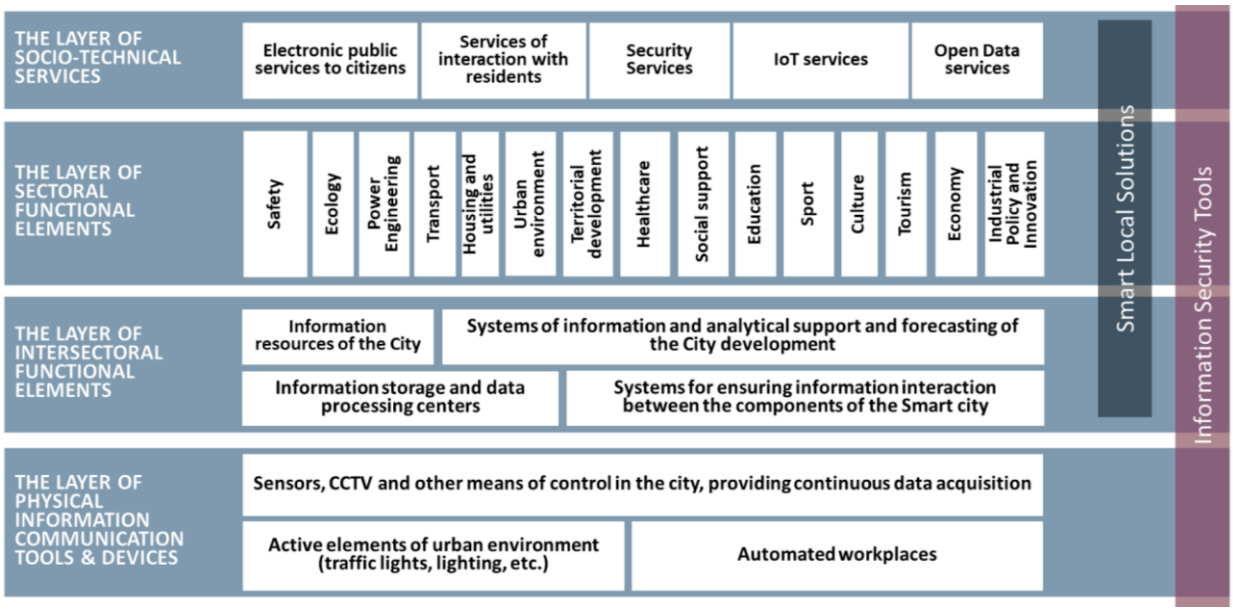

Figure 1. The structure of the interacting elements of smart city ecosystem

According to the Smart Saint-Petersburg Concept elaborated by the Project Office and approved by the city of St.Petersburg administration, the relationship between the different stakeholders and their motivation for involvement is outlined. These are citizens of all age groups, urban communities, public authorities and business organizations and NGOs. The

[44] Ibid.

main interested party are the citizens, whose needs should be met in order to establish better quality of urban life.

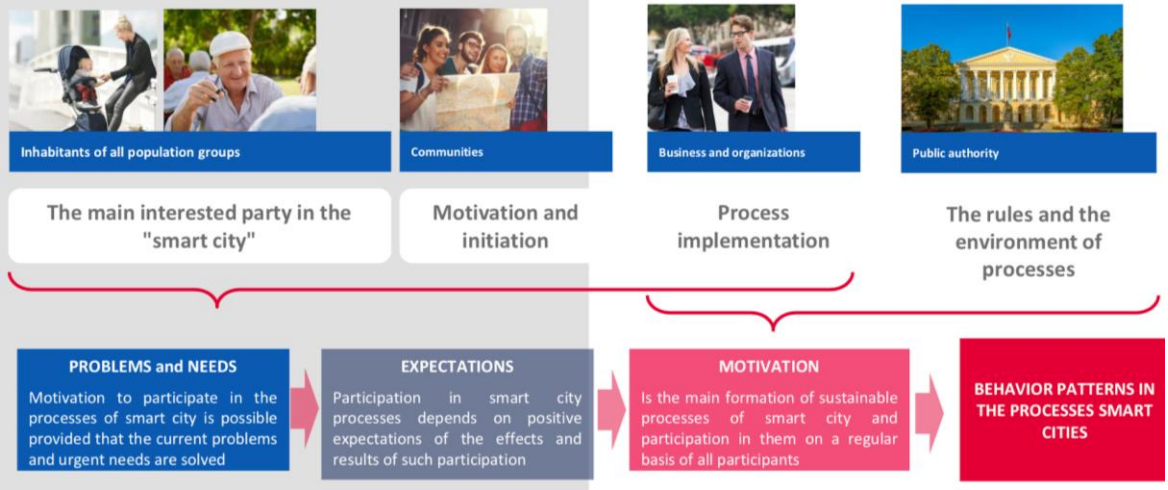

Figure 2. Algorithm for stakeholder involvement into “smart city” implementation

I.3. The position of St.Petersburg in smart city field in Russia

Thanks to vigorous activity both in the implementation of smart city projects and the development of an integrated approach for the development of the city, St. Petersburg always scores high positions in development ratings in Russia and often falls into world ratings.

In the mentioned Cities’ IQ Index St. Petersburg takes the third place having lost the championship only to the Moscow capital and Kazan, where the smart city agenda is several years older[45].

Another relevant index of sustainable cities was presented by SJM Agency and scoped 185 cities with a population over 100 thousands people. The positions of cities in the ranking are based on 42 indicators measuring three main areas of sustainable development: economic, environmental and social (including demographic). St. Petersburg took 2nd place among Russian cities with a population over one million people and 3rd place in the overall ranking, losing Tyumen to silver[46].

Inclusion of St.Petersburg into international ratings is occasional, while the latter usually include capitals or first leading cities of the countries (for example, New York in the USA, which is not the capital). In Russia, both of these places are occupied by Moscow, which gets into the rankings quite regularly. However St. Petersburg appears in more complex ratings. One of these is the international rating “IESE Cities in Motion” based on public polls (though

[45] http://d-russia.ru/wp-content/uploads/2020/03/prezentatsiya.-indeks-iq-gorodov.pdf

[46] http://agencysgm.com/projects/%D0%91%D1%80%D0%BE%D1%88%D1%8E%D1%80%D0%B02017.pdf

the samples are relatively small)[47]. It contains nine criteria - human capital (development, attraction and talents upbringing), social cohesion (consensus between different social groups of the population), economy, environment, management, urban planning, international relations, technology, mobility and transport (ease of movement). In total, 174 cities from 80 countries were rated in 2019 and St. Petersburg took 121st place (next to Istanbul and Doha) in the overall ranking and scored quite high in human capital (39th place) and urban planning (52nd place).

Another rating, also based on the public polls, was developed by the IMD World Competitiveness Center in conjunction with Singapore University of Technology and Design[48]. This index measures public perception of smart technologies progress and draws on the idea that smart city technologies are crucial for attracting investments and urban development. St. Petersburg took 73rd place; citizens particularly appreciated its cultural events, job search services, and public transportation.

II. Smart Saint-Petersburg Project Office

Smart Saint-Petersburg Project Office was launched as a cross-sectoral working group to run the dialogue between different stakeholders on the implementation of smart city in St.Petersburg. The first meetings started in August 2017. The Project Office was legitimized by the special order of the city governor (now former) Georgiy Poltavchenko. From the beginning Project Office has been a meeting point of different sectors - governmental bodies, business and science & education (universities). The sphere of NGO and civil society was underrepresented, however their representatives were planned to include further, after first processes and mechanisms of work were settled. One of the main features of the Project Office gathering was a key role played by the university sector, namely ITMO University (one of the leading IT and technical universities in Russia). ITMO University rector Vladimir Valiyev was appointed as a scientific curator of the Project Office, while the head of the office was the city governor himself. The PO aimed at public discussion of the concept, financial mechanisms and the priorities for smart city development in the city and for the direct cross-sectoral decisions made “at the round table”. Since August 2017 the PO has been meeting twice a month, however with the realections of the city governor in spring of 2019 the process has stopped for a year; in spring 2020 the first gathering was planned after a long period but was stopped by coronavirus COVID-19. The continuation of the PO activity as for now is planned for August 2020.

Eventually a functional scheme of several working groups was organized inside of the Project Office:

1. workgroup on Smart St. Petersburg concept design, led by ITMO university experts in smart city;

[47] https://media.iese.edu/research/pdfs/ST-0509-E.pdf

[48] https://www.imd.org/smart-city-observatory/smart-city-index/.

2. workgroup on creation legal & organizational conditions, led by the Committee for informatization and communication of St.Petersburg administration;
3. workgroup on methodological support, led by ITMO university experts in technology;
4. workgroup on PR, led by Saint-Petersburg Diary media;
5. Expert and technological council, led by Tranzas technological business company.

The structure of the Smart City program and the mechanism of its implementation are in the core of the Project Office activities. The selection of smart projects for the future implementation under the Priority Program is a 4-stage process:

1. Technical Assessment. Automatic bots check the compliance of the application by formal parameters.

2. Expert Assessment. Applications were reviewed by independent experts approved by the Project Office. Each application was tested by a minimum of three experts, anonymous to the author of the application.

3. Design Assessment. Applications selected by experts were approved by the project office. At this stage, the number of applications at the time of the formation of the Priority Program was 91.

4. Priority Assessment. The specialized committees of the project office with representatives of the authorities selected 62 projects that should be implemented in full or in pilot format for 5 years (i.e., until 2023).

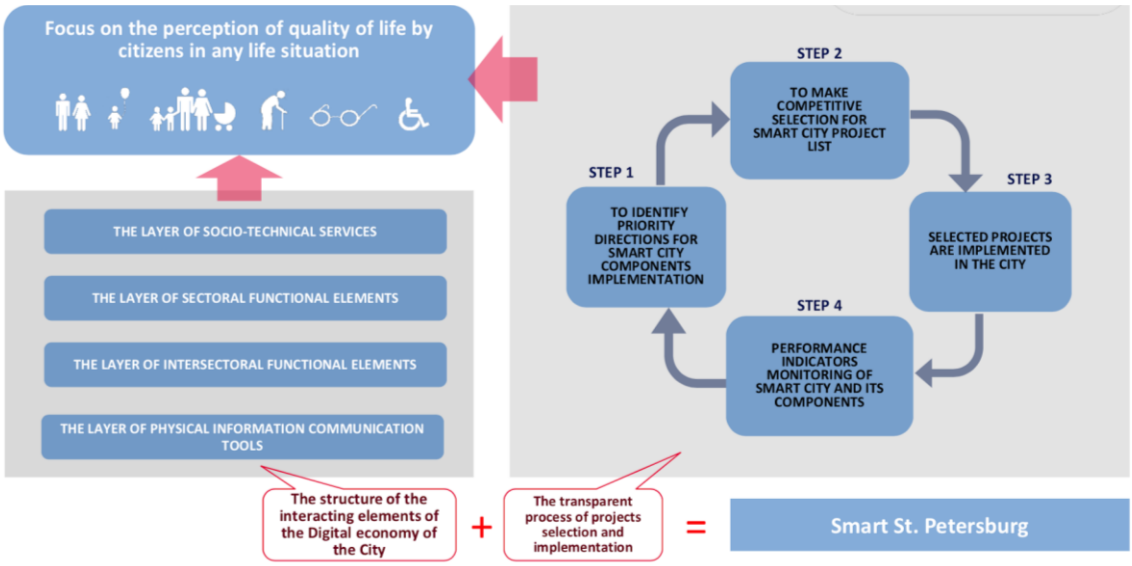

Figure 3. The layers of the “smart city” system and the process of implementation

www.petersburgsmartcity.ru is the beta version of the portal developed by the Project Office for collecting the ideas. The structure of the Bank of ideas is different from the structure of

the Ministry for Construction National Project. It includes functional areas which correspond to the functional division between the committees inside the city administration.

Figure 4. Project proposals for the Smart City Priority Program in St.Petersburg

In 2019, a program financing scheme for the smart projects was developed and approved, in which project financing is based primarily on grants. In 2020, the implementation of the program was suspended due to the pandemic situation, when all fixed assets and forces were transferred to fight the virus. Planned resumption of work on the project: August 2020[49].

In parallel with the development of the Priority Program, the city actively supported initiatives and pilots falling into the category of smart city and not requiring active intervention. Thus, projects were implemented to cover the city with a 5G WLAN network, new bicycle lanes, “citizen card” and pilot “smart bus stops”, smart lighting and others[50].

III. Smart Saint-Petersburg: Reality and Future

III.1. Successful “smart city” projects in St. Petersburg

Despite the fact that Smart Saint-Petersburg is a young project, there already are successful smart projects in St. Petersburg. They concern e-participation and e-governance, smart transportation and smart lightning. Here we are illustrating some of them.

"Public services" Portal

Portal “State and municipal services (functions) in St. Petersburg” (Portal) - a single access point to information and reference resources on the procedure for obtaining state and municipal services in St. Petersburg, as well as to the interactive section, which contains electronic application forms on the provision of services with the possibility of filling and

[49] https://ptelectronics.ru/stati/%D1%83%D0%BC%D0%BD%D1%8B%D0%B9-%D1%81%D0%B0%D0%BD%D0%BA%D1%82-%D0%BF%D0%B5%D1%82%D0%B5%D1%80%D0%B1%D1%83%D1%80%D0%B3-%D0%BA%D0%BE%D0%BC%D0%BF%D0%BB%D0%B5%D0%BA%D1%81%D0%BD%D1%8B%D0%B9-%D0%BF/

[50] http://tdaily.ru/news/2015/03/26/megafon-nastroil-lte-v-peterburge. https://regnum.ru/news/2797610.html

submitting them online[51]. Currently, more than 150 electronic services are provided through the Portal, additional services for making payments and paying state fees in electronic form are implemented. It is also possible to track the status of the application for the provision of services submitted earlier both through the Portal and at the multi-functional center (governmental subordinate organization providing public and administrative services in the city).

The authorized users of the Portal can access the Personal Account, where all user information is stored in a protected form. The user can fill out data about himself, his children, add information about his vehicle, so that later this information simplifies and speeds up the process of submitting electronic applications or making electronic payments. In your Personal Account you can view information on accrued fines and make payments on them.

Since the transition to the provision of public services in electronic form requires the provision of secure online identification for applicants, you can use the full range of services and services on the Portal only after registration. Registration on the Portal is based on the Unified Identification and Authentication System (ESIA). Registration in the ESIA is associated with the verification of criteria that are significant for an identity card, thus, the ESIA ensures the protection of the information contained in it in accordance with the legislation of the Russian Federation.

"Our Petersburg" Portal

The portal was created on the initiative of the Governor of St. Petersburg with the aim of increasing the effectiveness of the dialogue between citizens and authorities, as well as improving the quality of life[52]. On the portal a registered user can:

7. send messages about problems associated with housing and communal services and city improvement, the condition of roads and sidewalks, illegal objects of construction and trade, violation of land or migration laws;
8. inform city services about the lack of reference information on information stands, as well as unsatisfactory sanitary condition of the premises in budgetary institutions operating in the fields of education, health, culture, social protection of the population, and employment;
9. get additional information regarding special city programs, managing organizations, as well as background information on objects of interest;
10. get acquainted with the technical and economic passports of apartment buildings in St. Petersburg and get information about the organizations serving them;
11. receive information on the progress of consideration and development of messages sent by user;
12. evaluate the response received.

[51] https://www.gov.spb.ru/gosuslugi/

[52] https://gorod.gov.spb.ru/about/

Messages sent through "Our Petersburg" portal are mandatory for city services to consider in a strictly defined time frame. The portal is constantly being improved and expanded.

Commercial tram "Chizhik"

St. Petersburg has long been considered the world capital of trams; the largest number of tram tracks were laid here[53]. However, in recent years there has been a tendency to reduce tram tracks and transfer lanes for conventional vehicles. At the same time, passenger flows are redistributed between buses, trolleybuses and the subway. One of the most successful projects in the field of transport now looks all the more curious: several years ago the first commercial route "Chizhik" was launched. Unlike other modes of transport, which are serviced by enterprises with large shares of the city or state capital, this project is absolutely commercial.

Modern, high-tech rolling stocks of the Swiss company Stadler make a 3-section single space of the tram and ensure even distribution of passengers. The salon is quite spacious, with capacity up to 370 passengers. The structure is two-sided - with two control cabins and symmetrically located doors on both sides. The wagons have a completely lowered floor, which ensures ease of boarding and exit, as well as the availability of this type of transport for people with limited mobility. The salons are equipped with modern air conditioning and heating systems. Strollers are available. Inside each car there are information boards and speakers that inform about the route and the next stops.

New tram tracks have been created using modern technologies for noise insulation and vibration reduction of the rail track. Tram tracks go along a selected section of the road. A special dispatching system assumes a calling phase, providing a "green" corridor, thereby providing a priority for the tram when crossing intersections. These "smart" trams, moving on a separate canvas with a high average speed, are an effective form of urban public transport and are second only to the underground in terms of carrying capacity.

The tram payment system is fully integrated with the citywide system. In "Chizhik" all kinds of documents giving the right for privileged travel are accepted. The fare is based on urban public transport tariffs. Finally introduced in the 3rd quarter of 2019, Chizhik operates in one district of the city and has plans for two more.

III.2. Smart Saint-Petersburg Barriers

There are possible barriers that impede the development of "smart city" in St. Petersburg, confirmed by international studies and discussed at the meetings of the Project Office members with the similar smart city offices of Tampere (Finland) and Dortmund (Germany).

1. Slowness of city authorities. Russia as a country and St.Petersburg as a city are conservative. This is manifested at various levels, from preserving family traditions to

[53] http://chizhik-lrt.ru/

emerging problems in changing existing management style and habits. In a rapidly changing world such rigid structures can rarely respond quickly to challenges.

2. Hesitation of citizens. People are not always ready for change. Those projects are easily implemented, which make life easier, for example, a new tram line or a single center for receiving documents. Citizens are very careful on any projects in the historical center, and smart technologies do not always carefully approach the cultural heritage.
3. Peculiarities of Russian legislation. There is a rather complicated system for obtaining a primary permit for new infrastructure projects. However after the first stage of approval, the received documents simplify coordination with various authorities.
4. Different goals among stakeholders. As studies conducted by ITMO University showed, the authorities are more interested in security systems, business in profitability, and citizens are more interested in a beautiful and green city. Therefore, it can be difficult to agree upon the goals of smart city development.

III.3. Smart Saint-Petersburg future development

Smart Saint-Petersburg Project future is connected with two key domains: development of the Concept and the Priority Program.

As the city moves one and introduces new smart technologies, the concept should be reviewed and adjusted. In addition, its new versions should take into account new challenges of the time that could not be provided for in previous versions. An appropriate example is the coronavirus COVID-19 outbreak. Smart health was represented in the concept from the very beginning, however this block requires adjustment based on the consequences of the new challenge.

The Priority program can also be adjusted for the same reasons, however, it should not undergo drastic changes. Among the medium-term projects to be implemented in St. Petersburg in the next 2-3 years, the following can be noted:

- Creating an ecosystem of services for a city dweller. The project is implemented jointly by the Committee on Informatization and Communications and ITMO University. It is planned to streamline existing and develop new services for the city dweller associated with all the basic blocks of life. The presentation was supposed to take place in April 2020, but was postponed for known reasons.
- Systems of automated control of public safety. First of all, transport, courtyards and residential complexes. The system itself has already been implemented in almost the entire city; systems identify a person by her digital footprint (cameras, mobile data, payment data from bank cards, etc.) in automatic mode.
- Unified integration platform for housing and communal services. Data from numerous sensors, including those installed in apartments and highways, should more efficiently allocate resources and respond quickly to emergency situations.

- Smart library. Implementation of a project for access to electronic library collections with a single entry point.
- Unified electronic medical record (the project is integrated with a similar all-Russian project).
- Monitoring system for cancer patients, the elderly and people requiring an inclusive approach.
- Unified urban data platform. Most of the city data, except for those of strategic importance, is planned for opening for use by citizens and business.

The main long-term project at the moment is the City's Digital Twin - development of a situational analysis system based on automatically collected data. A large number of a wide variety of sensors have already been installed in the city, and the system of processing information from them and automatically making decisions is improved annually. It is assumed that in the future, all analysis systems will have to merge into one and make decisions not only on the basis of their own sensors, but also information from other analysis systems.