Interreg Baltic Sea Region

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RESPONSIVE PUBLIC SERVICES

3I solutions for PS

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Overview about A1.1

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The project 3I solutions for PS is implemented in the framework of the Interreg Baltic Sea Region programme.

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1 Introduction

The project "3I Solutions for Public Sector" (PS) aims to utilize digital technologies like augmented and extended reality (XR) to revolutionize public service delivery in the Baltic Sea Region (BSR). This initiative acknowledges the distinct demographic and geographical features of the BSR, with a large population residing in small cities and municipalities (see Figure 1). It delves into the difficulties these smaller communities encounter when adjusting to digital transformations and enhancing public services.

1.1 Background

Within the BSR, 21% of the EU's population resides in various small cities and municipalities, creating a unique environment for public service innovation. In contrast to heavily populated urban areas, innovation pathways in these regions are not as well researched. Limited resources, digitalization obstacles, and a cautious risk strategy frequently constrain public sector institutions in these areas. The focus of this project is to identify and implement digital solutions to enhance public services in environments that are challenging and lack innovation.

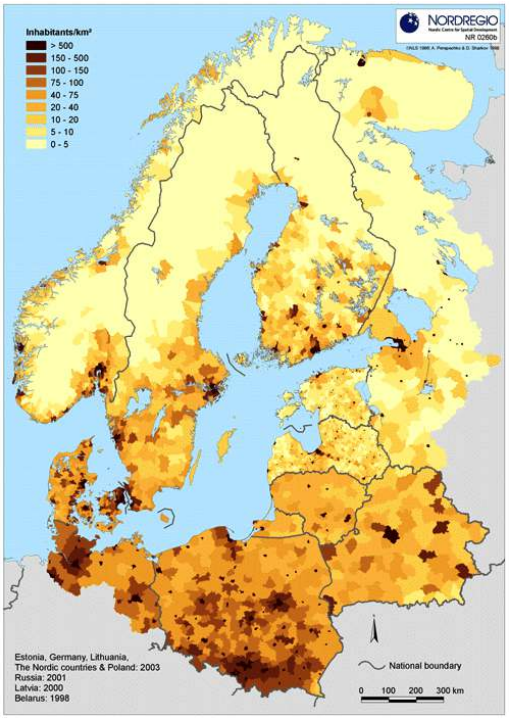


Figure 1. Population Density in the Baltic Sea Region (Nordregio, downloaded May 15, 2007)

1.2 Research gap and limitation

Before compiling the questionnaire, we conducted a literature analysis, which revealed a dearth of research on innovation management in small cities and municipalities. Several recent studies and statistics highlight the integration of innovation and technology in the major cities of the BSR region. This survey aimed to identify the primary barriers and factors impeding innovation implementation in small cities, gather intriguing case studies for research and inclusion in the final handbook, and identify important topics for hackathon challenges.

The main limitation of the survey was a lack of time and active participants.

With an initial target of 100 responses for your survey, as of February 11, 2024, we have successfully collected 70 responses. The survey is still active, indicating there's potential to reach or even exceed your goal. We excluded one response from Germany from the count due to its lack of representativeness. We still managed to gather a gallery of cases and challenges, which we will discuss later.

On August 1, 2024, we finally collected 108 answers, surpassing our original goal and providing us with a robust dataset for analysis. The survey is now officially closed, marking the successful completion of our data collection phase. We will update all the findings and analyses accordingly to ensure this overview reflects the most current and comprehensive information.

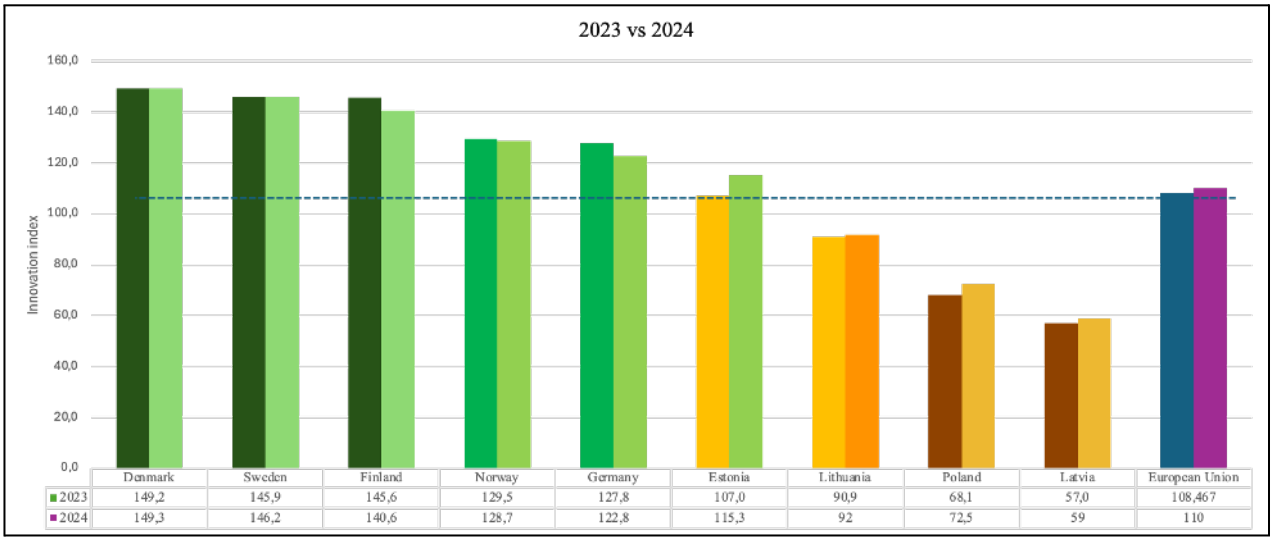
1.3 Objectives and the research questions

This project's survey aims to collect insights directly from administrators and professionals in small municipalities' public services. The main goals are to:

- Grasp the particular obstacles and difficulties these organizations encounter when embracing new solutions.
- Discover the main tools that can support the effective integration of intelligent technologies in public service delivery.
- Find hot topics for future hackathon in Kaunas.
- Collect successful or lesson-to-learn examples of public service innovation (PSI) and analyze them to identify the most "painful" areas of innovation.
- And last but not least, understand the current state of innovation within small municipalities and how they evaluate themselves.

In addition to the core questions about innovative activities, we ask participants about XR, VR, and AR technology and their readiness to implement it in real life. The final section is a survey of public service users (PSU) to determine how they feel about living in specific areas. After all, what officials think is one thing, but what residents think about their city or municipality is quite different.

Despite the fact that there is an innovation scoreboard that compares the level of research and innovation performance of EU Member States, other European countries, and regional neighbors, it presents the general level without focusing on PSI. But even with that scoreboard, we can see that the level of innovation in the BSR region is drastically different between Nordic countries, Baltic states, Germany, and Poland (European Commission, 2024). It is worth mentioning that all the Baltic countries and Poland have shown stable growth, as illustrated in the graph below (see Figure 2). Notably, Estonia has made a significant leap forward, moving from the "Moderate Innovators" category to the "Strong Innovators" category.



	Denmark	Sweden	Finland	Norway	Germany	Estonia	Lithuania	Poland	Latvia	European Union
2023	149,2	145,9	145,6	129,5	127,8	107,0	90,9	68,1	57,0	108,467
2024	149,3	146,2	140,6	128,7	122,8	115,3	92	72,5	59	110

Figure 2. Summary Innovation Index of BSR in 2023, compared to 2024 (European Commission, 2024)

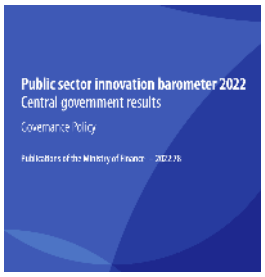
2 Methodology

Our methodology is based on a comprehensive approach that combines various known sources to create a successful questionnaire, followed by a detailed process of data gathering and analysis. We discovered all these methods during the preparation phase in September–October, when we conducted literature database research. The main goal was to find a working methodology that would have already been applied in this type of research.

2.1 Survey Design

We created the questionnaire using numerous important references with the goal of assessing innovation in the public sector. These sources include:

The Innovation Barometer for the Public Sector: This source provides baseline measures for evaluating public sector innovation, with an emphasis on the Nordic model.



Public Sector Innovation Barometer 2022, Central Government Results, Publications of the Ministry of Finance, 2022:78, Helsinki, Finland — We conducted a thorough analysis that sheds light on the innovation environment in Finland's central government sectors and establishes a crucial foundation for our survey.

The Copenhagen Manual is a guideline for stimulating and measuring public sector innovation, including important frameworks and procedures that helped shape our questionnaire.

Our main goal when creating the questionnaire was that it would simultaneously contain all the questions of interest while not consisting of a large number of questions and not taking up much time. Therefore, we conducted the pilot several times to reduce the likelihood of a survey response interruption.

To guarantee the questionnaire's reliability and usefulness, we did three rounds of pilot testing with a small group of about 15 participants. This iterative method entailed gathering input and modifying the questions several times to solve any faults and improve the survey's overall design. The Webropol platform administered the final version of the survey, offering respondents an efficient and user-friendly experience.

2.2 Data Collection

We designed the data collection process for each participating country in the study to capture a diverse range of opinions and experiences related to public sector innovation. This section will go over the unique approaches used in each country to collect data, such as participant selection, distribution methods, and response rate optimization techniques.

Below, we share the various techniques used in different countries. The final response rate summary is presented in Table 1.

2.2.1 Partners response rate

Finland: To collect survey samples in Finland, we employ a combination of methods: utilizing LinkedIn to target professionals, leveraging personal and client contacts of project partners for a more direct approach, and making direct requests through public service web pages.

Estonia: In Estonia, our approach to collecting survey samples involved multiple dissemination channels. Initially, we focused on gathering email addresses from various public service providers and authorities. However, this method did not yield successful results. After adjusting our strategy, we targeted emails from individuals responsible for the development of specific regions or municipalities. This refined approach proved effective, resulting in 23 responses.

Latvia: In Latvia, the survey sampling strategy encompassed a broad email campaign and targeted phone outreach, complemented by public distribution. We sent out 58 email invitations, which included reaching out to the Latvian Union of Local Governments and municipal business's

specialists. We specifically sent 16 emails to entrepreneurs, asking them to spread the survey further within their networks. Alongside the email efforts, we conducted 4 phone calls to directly engage potential respondents. We also publicly posted the survey on the municipality's website to reach a wider audience.

Lithuania: In Lithuania, our survey sample collection combined personal contacts (up to 5 individuals) and broader outreach through emails to municipalities. For non-personal invitations, we used general greetings targeting departments like investment, innovation, and strategic planning, or the main secretariat email when specific contacts were unavailable. Additionally, we sent 120 personalized emails to individuals in these departments, which significantly improved response rates once we deployed these tailored communications.

Poland: The data collection approach for Polish partners includes contacting PSPs, including Associated Organizations (AOs), mostly via phone calls and emails. In addition to direct outreach, the partners improved the data gathering procedure by organizing a webinar. This event served as an engaging platform for not just disseminating project information but also directly inviting attendees to complete the survey within the webinar.

	Sample	Responses	Response rate
Finland	334	22	7 %
Estonia	167	23	14 %
Latvia	116	19	16 %
Lithuania	125	16	13 %
Poland	108	28	26%

Table 1. The response rate by country

Table 1 compares sample sizes, the number of responses received, and matching response rates across countries. These numbers show an important variation. It is crucial to highlight that a smaller sample size and lower response rates can increase statistical uncertainty in our findings. As a result, when interpreting these findings, it is important to keep some degree of ambiguity in mind.

Regardless of these issues with methodology, the benefits of learning from each country's data, including uncertainties, far outweigh any reservations we may have. Moreover, the total findings

across BSR countries demonstrate remarkable consistency. These findings enable us to use the observed disparities as the basis for additional discussion and in-depth research.

In conclusion, while we should exercise caution when estimating the actual number of disparities due to response rates and sample sizes, the data provides a useful comparative viewpoint.

2.2.2 Webropol response rate

The Webropol system also provides its own statistics, see Table 2.

All responses	(N)	%
A survey was opened by respondents	1 169	
Started responses	239	20 %
Paused responses	1 135	97 %
Submitted responses	109	9 %

Table 2. The follow-up table is provided by Webropol.

Unfortunately, the Webropol system does not provide a technical option for sending a reminder to people who have begun to react via a web-page link; yet, after sending a personal email and then a reminder, many continue to ignore the answer. So we can assume that if the person is interested in answering and participating in the survey, they will respond immediately; if they pause, it suggests they will forget about it.

2.3 Data analysis methods

In our study, we decided to combine quantitative and qualitative methods in order to analyze different approaches in different BSR countries as widely as possible. Our quantitative method, which was based on Microsoft Excel, allowed us to objectively examine the data, identifying patterns, trends, and correlations that provided insights beyond just qualitative research, increasing the validity of our findings and providing the basis for drawing valid conclusions regarding PSI.

In parallel, we conducted a qualitative analysis that delved into the complexities of the case studies and challenges, using a structured, multi-stage process to capture the essence of public

opinion. sector innovation in different contexts. This included the initial collection of responses to specific questions. Despite the entire questionnaire being in English, we allowed respondents to answer open-ended questions in their native language, allowing them to fully express their thoughts and emotions. We then translated these data into English (if necessary) and sorted them by type of PSI (see Figure 3) using a defined structure to facilitate a systematic and focused study.

By carefully classifying real-life examples, we not only effectively organized the data but also laid the foundation for a thorough thematic analysis. This dual approach, combining quantitative precision and qualitative depth, allowed us to present a complete picture of innovation in the public sector. Our methodology demonstrates a different approach to data analysis; the same issue can be considered from different points of view, thereby giving a broader picture.

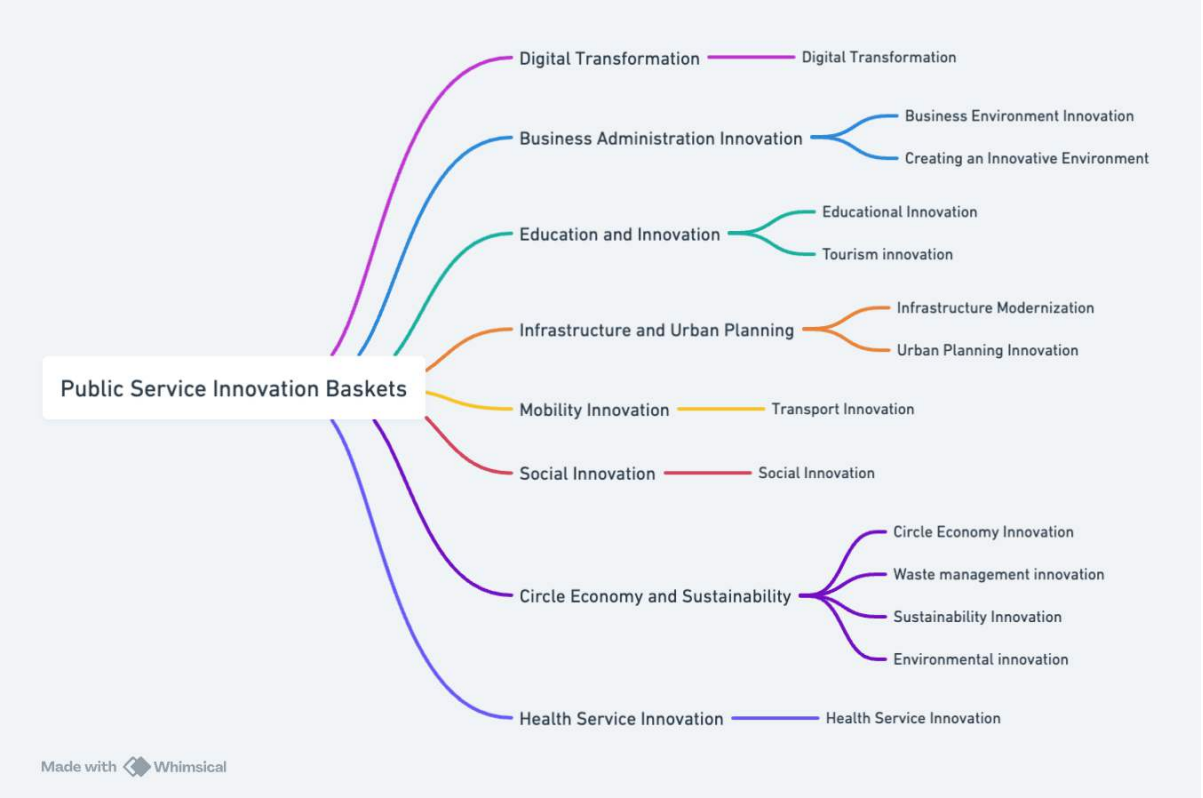


Figure 3. The Public Service Innovation “baskets” for sorting real-life cases.

3 Survey analysis and results

3.1 General information about the survey

Overall, we divided the survey into four different modules:

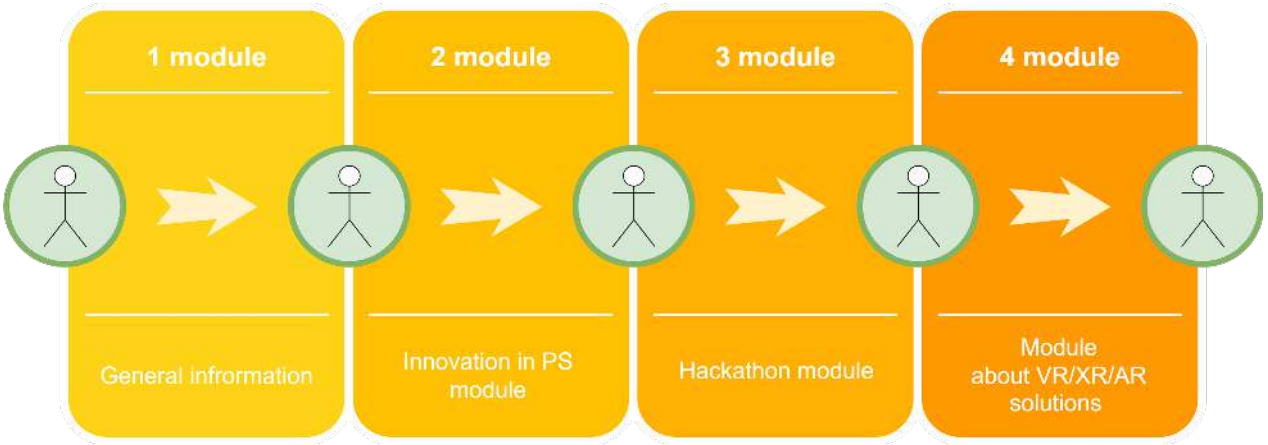


Figure 4. The visualization of the survey.

We designed each survey's modules to focus on a single topic, providing critical information for our final research. Additionally, we conducted a second survey among public service users (PSU) to supplement the acquired dataset and viewpoints. We attentively linked this secondary survey to the first one to ensure a comprehensive understanding of the subject from various perspectives. We have sorted and divided the collected information into several modules for a methodical examination, which will shape the overall conclusions of your investigation.

3.2 Module 1: General Information about Participants

The first graph in this module displays a comparison of survey participation in five BSR countries. With 23 respondents, Estonia is in the lead for involvement in this survey. Latvia and Lithuania contribute 19 and 15 respondents, respectively. Meanwhile, Finland and Poland have more moderate participation rates, with 5 and 7 respondents, respectively. In total, 69 BSR respondents participated in the survey.

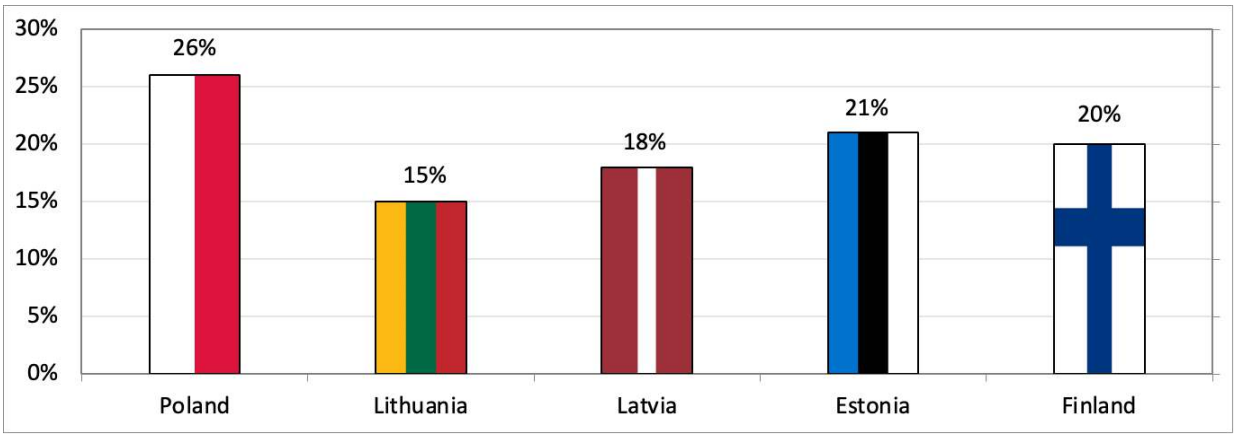


Figure 5. The distribution of responses by BSR countries.

Next, we were interested in collecting answers from two different groups: public service providers and authorities. In Figure 5, we can see that we collected an almost equal number of respondents from both groups.

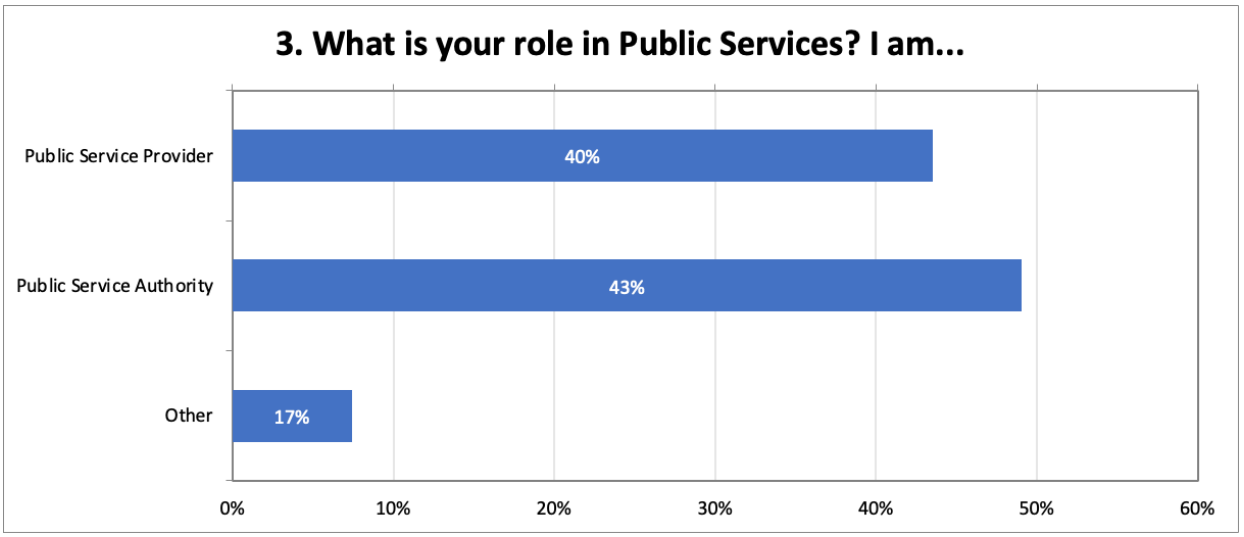


Figure 6. The role of respondents to the questionnaire

As the graph demonstrates, we also received 8 "other" answers (18%). We considered these responses valid and included them because they presented interesting cases and challenges, which enhanced the study's overall data set and findings.

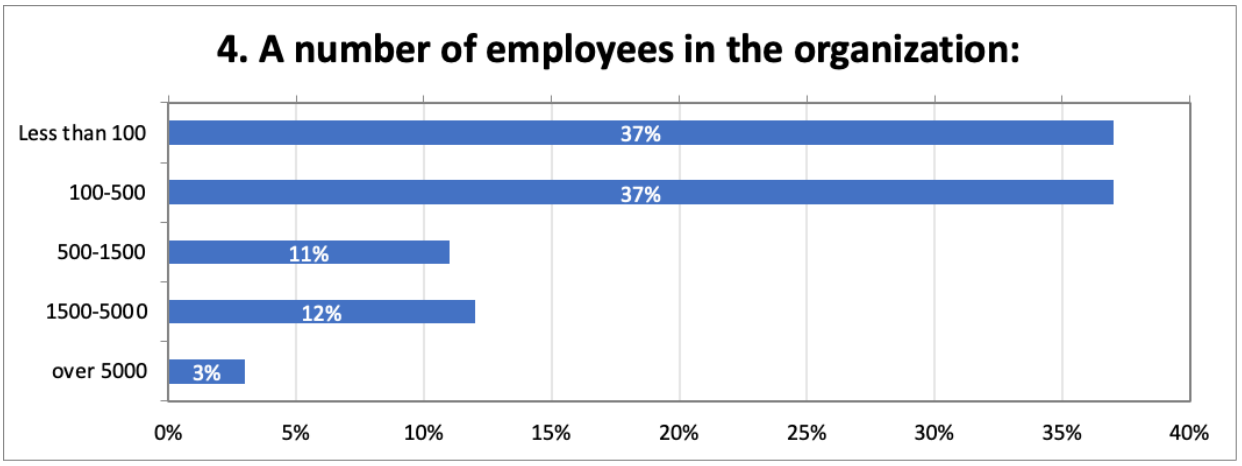


Figure 7. The size of organizations in which respondents work is distributed by participating countries.

The data presented in the graph clearly indicates that our focus is primarily on small to medium-sized organizations. With 74% of the organizations having fewer than 500 employees (37% with less than 100 employees and another 37% with 100-500 employees), this focus allows us to gather insights that are particularly relevant to this segment. The comparatively smaller representation of larger organizations (only 3% with over 5000 employees) further emphasizes our emphasis on smaller entities.

Summary of Module 1.

Here, we provide a summary of module 1 in preparation for the ultimate conclusion and analysis:

- Survey Participation by Country: Poland leads with 28 responses, Estonia has 23, Finland has 22, Latvia and Lithuania trail at 19 and 16, respectively, totaling 108 BSR respondents.
- Target Respondent Groups: a balanced collection of responses from public service providers and authorities; inclusion of 8 responses under "other," providing unique cases and challenges that are valuable to the overview.
- Small and medium-sized public service organizations were the primary focus of our survey.

3.3 Module 2: Innovation in Public Service in BSR

Module 2 investigates the level of innovation in BSR public services. Our primary purpose was not to collect theoretical "dry" statistics but to discover something unique in each country that we could then investigate and include in our future handbook and training course for PS professionals for effective implementation of innovation in BSR, or perhaps even beyond.

3.3.1 Introduction to Module 2

First of all, we wanted to know the overall level of innovation in a particular region. The question was: ***5. Between 2017 and 2023, did your institution undertake activities perceived as 'innovative' by your organization or the community?*** We designed the survey so that if the respondent said "yes," he/she would proceed to the next question, which required him to identify the most significant innovations achieved in his organization (city, region, or municipality). If the respondent answered "no" or "I'm not sure," we did not automatically lead him to the following question, but rather questioned him: ***7. What achievements of your organization are you proud of? Why?*** Each country has respondents divided into three categories (see Figure 8): those who answered "yes," indicating participation in innovative activities, those who answered "no," signifying no such participation, and those who are "not sure."

We assumed that when people think about innovation, they most often associate it with having to come up with something new from scratch. But that is not true. According to the OECD (2016), "*innovation in the public sector refers to significant improvements to public administration and/or services. It can be defined as the implementation by a public sector organisation of new or significantly improved processes, methods, or services aimed at improving a public sector unit's operation and outcomes.*"

As a result (see Figure 8), a majority (65 answers) of public sector workplaces are engaged in innovation activities. We received a total of 128 different examples from five countries between 2017 and 2023, and we eliminated only one due to limited information. Also worth mentioning is that 7 out of 10 respondents answered "No" to the question regarding institution innovative actions, who still provided us with 7 examples of different types of innovations, but they do not

consider it an innovation; they are just proud of these actions. Finally, if the person was not sure about organization activities (33 answers), they did not provide any examples.

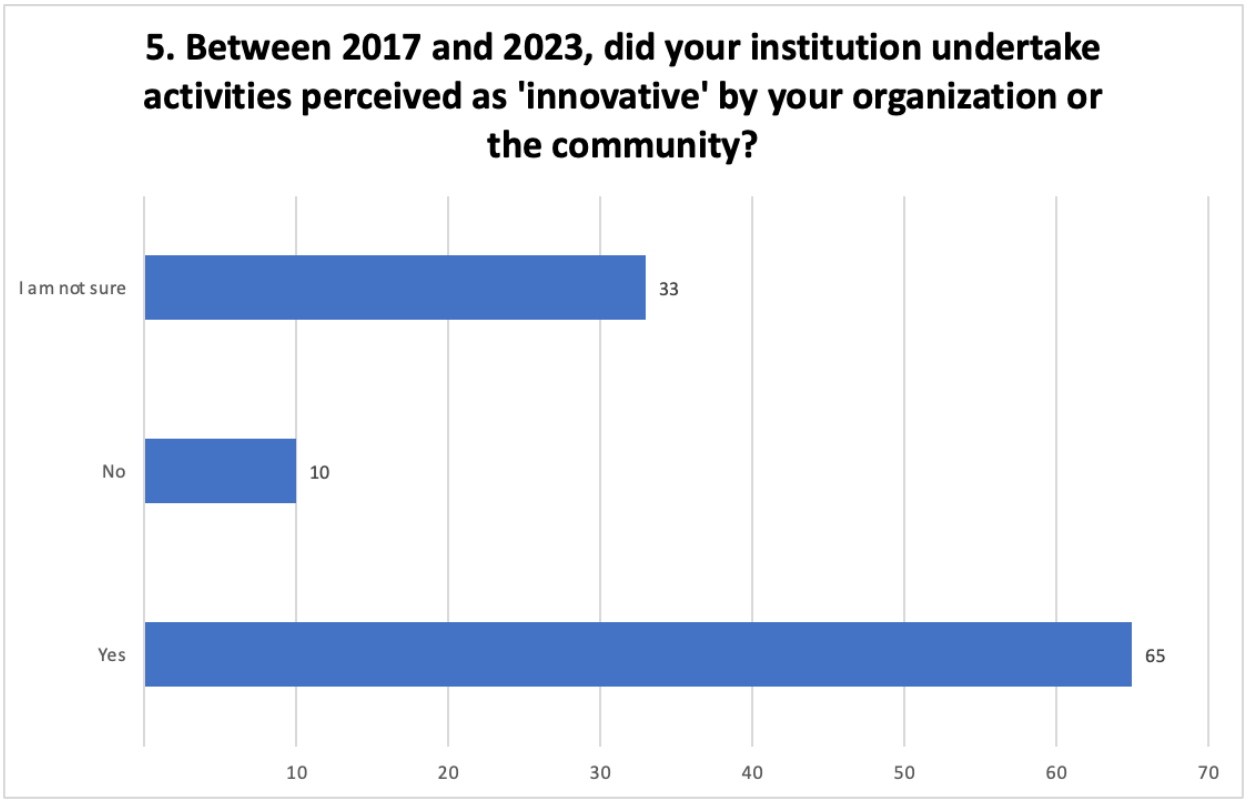


Figure 8. Share of public sector workplaces that have introduced one or more innovations within a five-year period.

3.3.2 Cases analysis

As mentioned, collecting BSR cases was a major goal. We asked people to describe the latest innovation you or your organization introduced between 2017 and 2023, even if you perceive it as unsuccessful. As a result, out of 73 answers, we received 135 cases; 133 of them can be classified as successful and 2 as unsuccessful. The full table of cases is provided in Appendix 4. The summary table of cases provided by respondents.

The final sorting (Figure 9) illustrates the distribution of innovation efforts among Poland, Lithuania, Latvia, Estonia, and Finland. It demonstrates how survey participants in these countries described different strengths and priorities. It's important to keep in mind that these results are based on what respondents said in the survey, not exactly what the country's most important innovation areas are.

Poland and Latvia are the leaders in a number of innovation categories, according to the survey. Poland is leading in areas like **digital transformation** and **urban planning innovation**, while Latvia is highly active in areas like **social innovation** and **modernizing infrastructure.** Additionally, only representatives from Latvia provided examples of tourism innovation.

Estonia's efforts, especially in creating an innovative **environment and sustainability innovation**, show that the country is reportedly putting a lot of thought into making its economy and society more resilient and future-focused. The poll results show that Lithuania's focus on **digital transformation** and **sustainability innovation** points to a planned way of combining new technologies with environmentally friendly methods. Even though Finland has fewer cases in total, it does very well in educational innovation and sustainability innovation, which is consistent with its strong track record in environmental and education projects.

This graph serves as a valuable visual summary of the innovations shared by poll participants, offering insights into the region's current and emerging priorities. In the near future, we plan to select and analyze different cases, much like we did for the article *Innovations in Small Cities: Toward the Handbook for Life Changers.* This analysis will assist us in better understanding the key strategies of innovation movements in the region and how to innovate faster and more effectively in small- to medium-sized organizations.

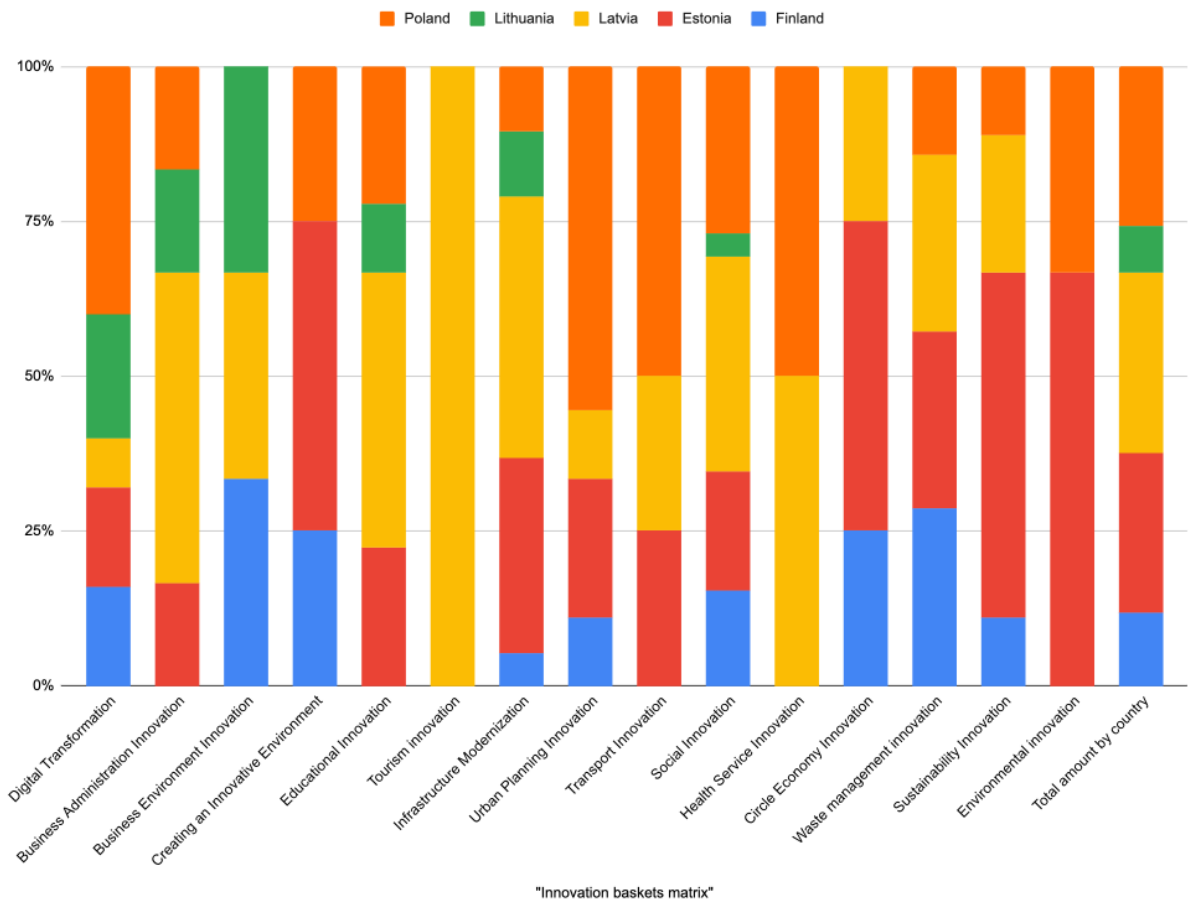


Figure 9. The distribution of cases by types of PS innovations and countries of the BSR region.

3.3.3 Innovative Environment at the Workplace

First, we sought to determine the extent to which respondents' organizations contribute to stimulating innovative activities, using a scale ranging from 0 to 10. The cumulative feedback yielded an average score of **6.2**. Figure 10 provides quantitative illustrations of the perceived innovation climate within these organisations, indicating a moderate level of effectiveness in cultivating an environment conducive to innovative behaviours.

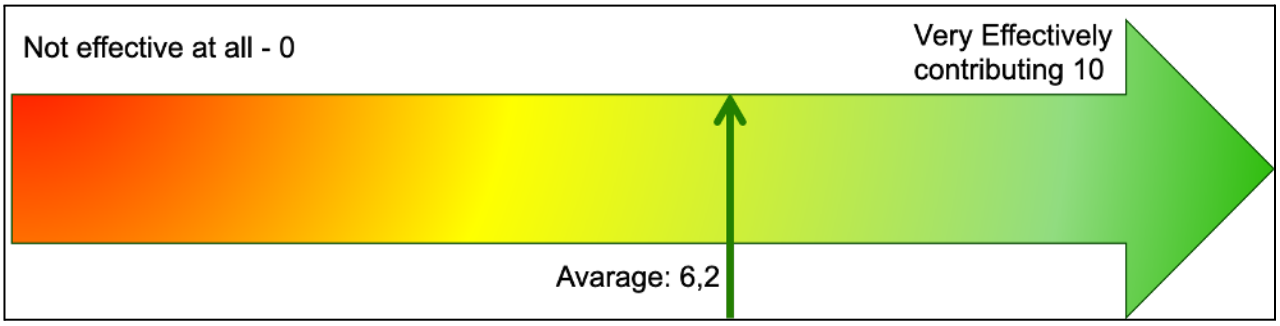


Figure 10. The grade of innovation stimulation across participants's organizations.

The next question (see Figure 11) aimed to identify the organizational structure that supports innovation by asking if there was a dedicated individual or department coordinating such initiatives within the previous five years. The bar chart depicts the results: While 24% of organizations confirmed having such a person or department, 54% did not have a defined person or department for innovation, and 24% expressed doubts. This data indicates the organization's emphasis (or lack thereof) on innovation processes within various entities.

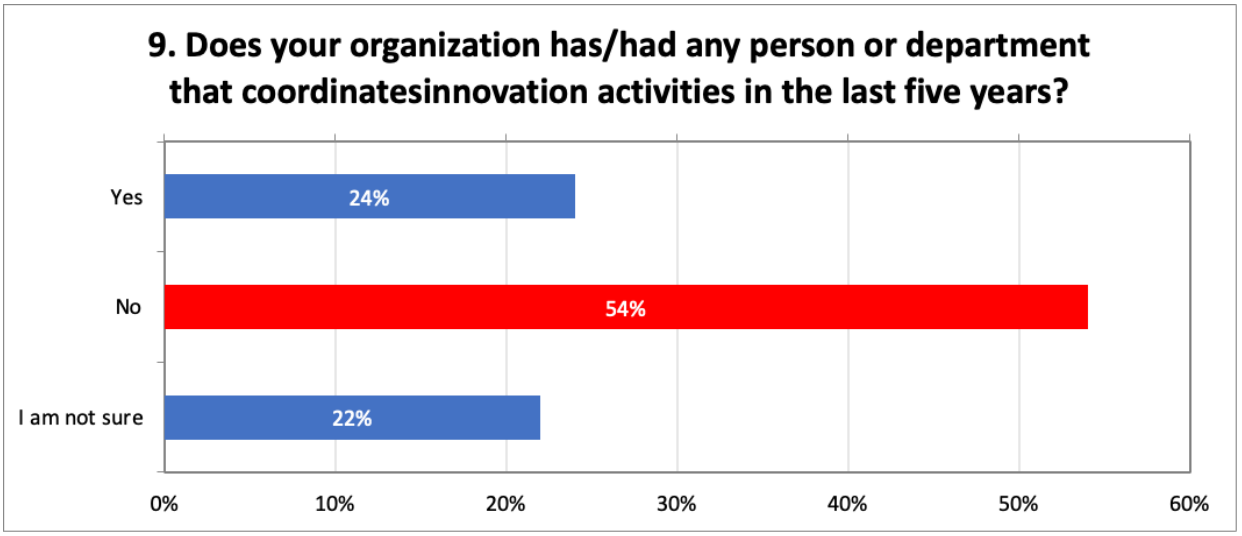


Figure 11. The Organizational Coordination of Innovation Activities.

The fact that 54% of PSPs or PSAs don't have a designated person or department for innovation activities is even more surprising when you look at the best ways to boost innovation that have been found (see Figure 12). We saw leadership and team support as the most important factors in driving innovation forward. The difference could suggest that, although the organizational structure acknowledges the value of leadership in principle, it may not reflect it.

Also, a lack of focused leadership and a dedicated innovation team could make the other top strategies less effective. These include allocating funds for implementation, encouraging collaboration between organizations, making sure community engagement and inclusive planning happen, and using educational and agile approaches. Without a leader or team to organize these initiatives, companies may struggle to efficiently access money, work across departments and with external partners, engage with communities, and capitalize on educational opportunities for innovation.

This gap shows that these companies could grow, and it stresses the need to create roles or departments that encourage and streamline innovation activities, in line with the survey's recommended methods. By closing this gap, PS organizations can better position themselves to reap the benefits of innovation while remaining competitive in their respective areas.

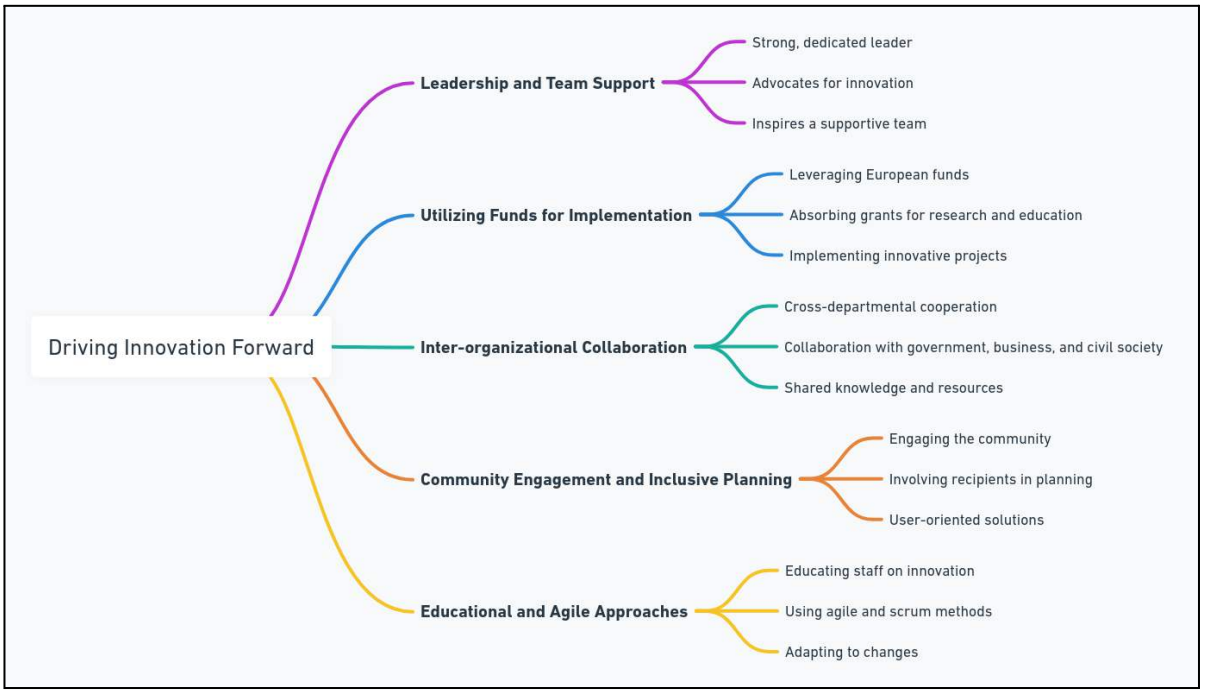


Figure 12. Basic strategies that should support PSI.

3.3.4 Communication

The last section of Module 2 focuses on the communication methods used by public services to notify residents about innovative activities. It examines the many routes via which organizations disseminate information and how respondents typically obtain updates on innovation in public services. To keep citizens informed about new projects and changes that could affect them or their community, it is crucial to understand these communication tactics.

The bar chart (see below Figure 13) provides an engaging look at the variety of communication channels organizations utilize to notify the public about their innovative efforts. It categorizes the channels and provides percentages for each degree of response (from 1 to 5). Websites, newsletters, and social networking platforms appear to be the most popular channels, judging by the large number of level 5 responses. More evenly distributed answers at all levels indicate that events and news media coverage also play a significant role. The prevalence of level 1 answers demonstrates how much more limited communication, street advertising, and scientific publications are. This chart not only provides a quantitative picture of communication preferences, but it also highlights areas where firms should focus their efforts to raise public awareness of their creative activities.

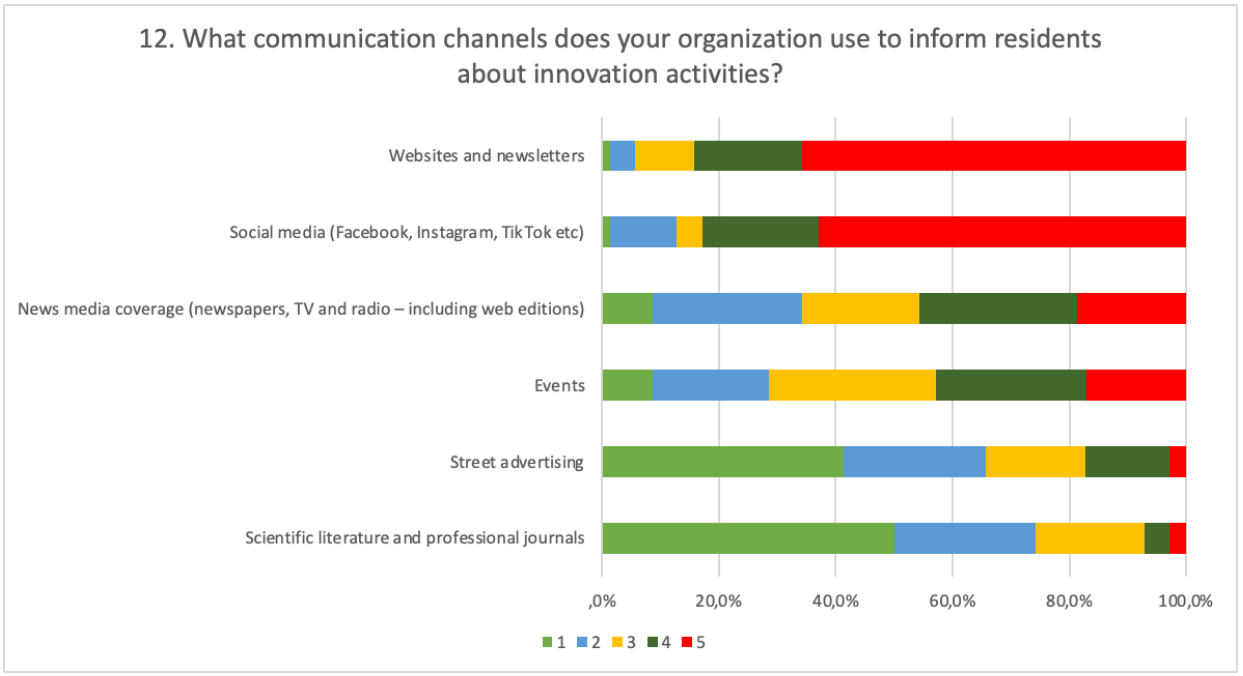


Figure 13. The main communication channels for residents.

The next chart (see Figure 14) illustrates the different channels through which PS professionals receive information about public service innovations. It highlights social media (Facebook, Instagram, TikTok, etc.), websites and newsletters, internet search engines (Google, Bing, Yahoo, etc.), participation in events like conferences, seminars, or training, news media coverage (newspapers, TV, and radio), and AI searching tools (like ChatGPT or Bard) as key sources of information.

Social media and websites/newsletters are the most frequently used channels, with a significant portion of respondents rating them highly effective (levels 4 and 5). AI search tools show a diverse range of effectiveness, suggesting that while some find them highly useful, a substantial number rate them lower. The effectiveness scale consistently shows a more balanced distribution of responses for traditional news media and internet search engines, indicating their consistent use with varying degrees of satisfaction. The lower ratings suggest that people rely less on event participation for information about innovations in public services.

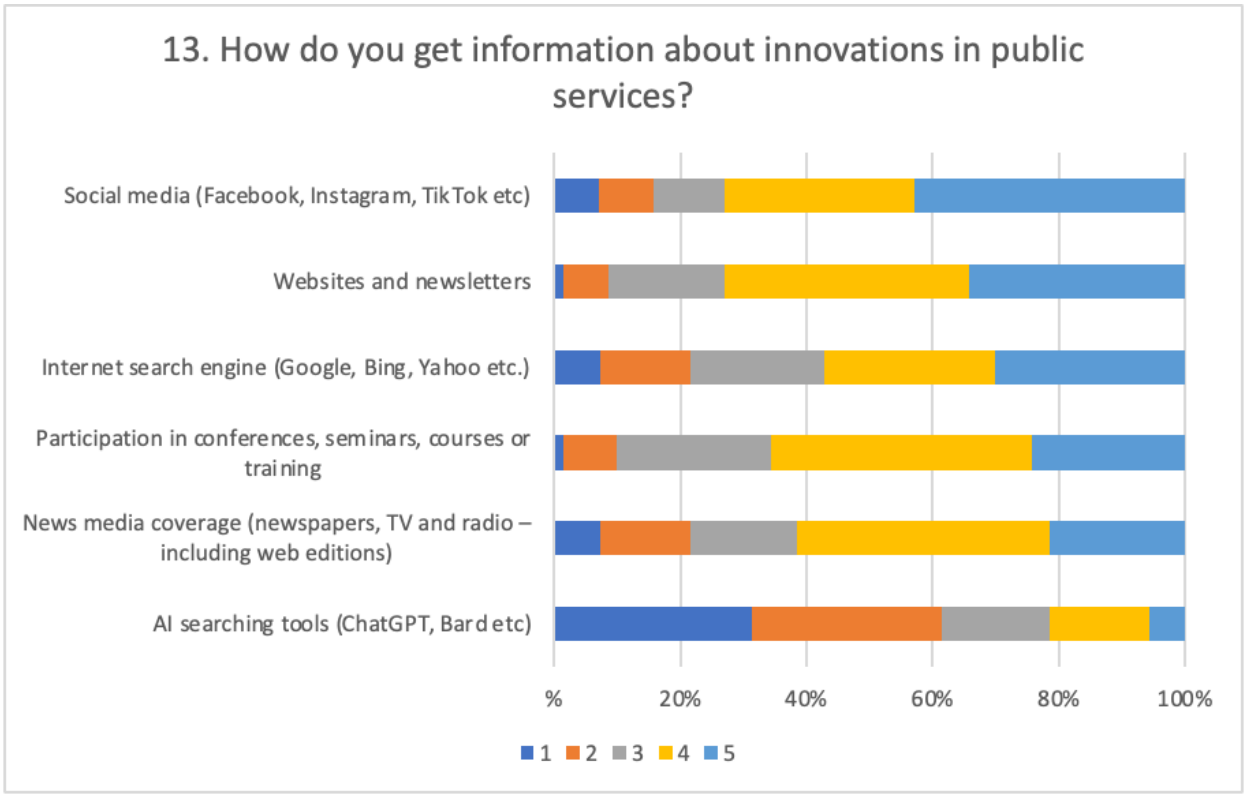


Figure 14. The main communication channels for PS professionals.

Summary of Module 2

The module's summary would provide guidance for public services that are interested in improving their innovation processes and public communication, emphasizing the importance of dedicated leadership and targeted communication methods for successfully innovating and engaging with the larger community.

Module 2 focuses on the following key areas:

- The initial questions aimed to assess the general innovation landscape within certain regions, inviting respondents to consider the key inventions that their firms had achieved.
- A call for contributions of recent innovations yielded a diverse collection of 135 innovation cases, the majority of which received successful ratings. These cases, described in an appendix, provide empirical proof of innovation practices.
- The average score in the Innovative Environment Assessment was 6.2, which means that most of the companies surveyed had an average creative environment.
- The results show that less than a third of companies had a specific person or department in charge of innovation. This could mean that they missed opportunities to use creative strategies more effectively.
- The study looked into how public services communicate with residents about innovations, and found a reliance on websites, newsletters, and social media. The responses also underscored the importance of businesses developing effective communication strategies to keep the public informed and interested.

The results from Module 2 show that there is a desire for innovation in the BSR, but there are big gaps in both the institutional support within organizations and the ways that these innovations can be shared with the public. This module's findings could have a significant impact on future public service innovation efforts in the BSR and beyond.

3.4 Module 3: Challenges for Hackathon

Understanding the multiple issues that cities and municipalities face is critical for successfully steering social innovation and addressing community needs. A recent analysis pinpointed 150 challenges, offering crucial insights into the most urgent issues that social hackathons could potentially tackle. We rigorously translated these difficulties for clarity, then methodically classified them by kind, revealing patterns and areas requiring immediate action.

The chart (see Figure 15) shows that **community and social well-being** are at the forefront, receiving 42 mentions. It means that for all participating countries, community well-being and social problems are a top-class priority right now. The main issues here are population aging, unemployment, a lack of digital skills among certain groups of people, and even domestic abuse.

Second place is occupied by **civic engagement and participation** of people in the decision-making process, with 38 mentions. This suggests that there are significant challenges in ensuring active civic involvement and participation in community and societal initiatives, the dialog between people, who are living in the area and the authorities is difficult, and this prevents us from developing faster and more effectively.

Rounding out the Top 3 of the summary of challenges are **environmental and sustainability challenges**, with 29 mentions. Issues such as sustainability, the circular economy, climate change, pollution of the Baltic Sea, waste management challenges, and the need for new types of collaboration with companies are not only critical in public services but are also pressing concerns globally. Addressing these challenges will be crucial for creating a more sustainable and resilient future for the region and beyond.

These problems are more than just numbers; they reflect community members' lived experiences as well as local government operating realities. Pie charts graphically depicted the frequency of each type of challenge, which Appendix 5 then divided into "country profiles" based on participating countries. This degree of information provides stakeholders with the knowledge necessary to tailor hackathon projects to the specific needs of each region, ensuring that creative problem-solving efforts are as successful and context-specific as feasible.

By tackling these critical issues, towns and municipalities may encourage community-wide innovation, promote sustainability, and stimulate educational and economic growth. The findings of this investigation can thus serve as a beacon for social hackathons, directing them toward solutions that have a tangible influence on people's lives and the larger societal infrastructure.

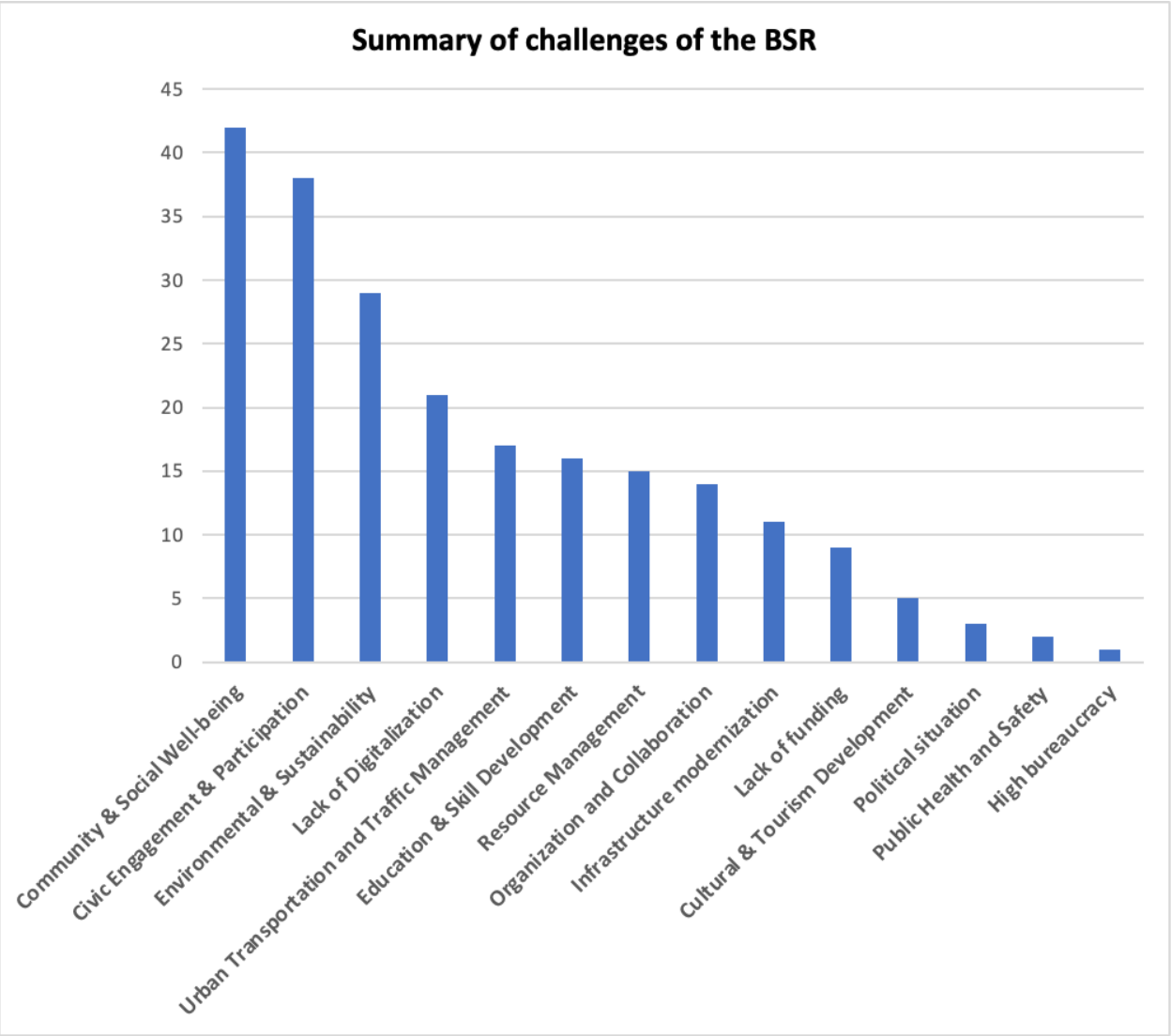


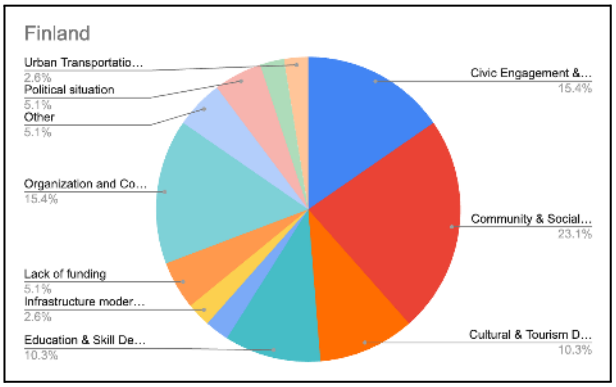
Figure 15. The possible set of challenges for Kaunas Hackatone.

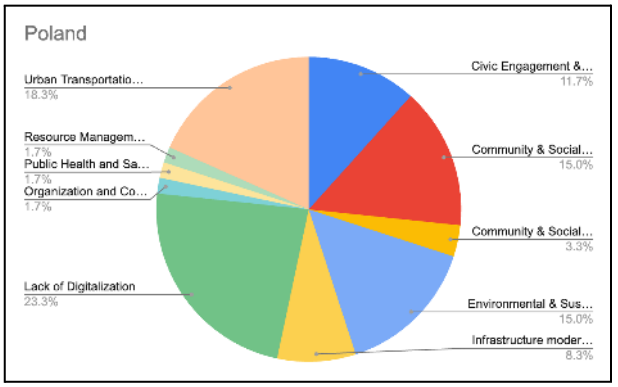
The pie charts below illustrate the distribution of challenges reported by respondents across Finland, Poland, Lithuania, Latvia, and Estonia.

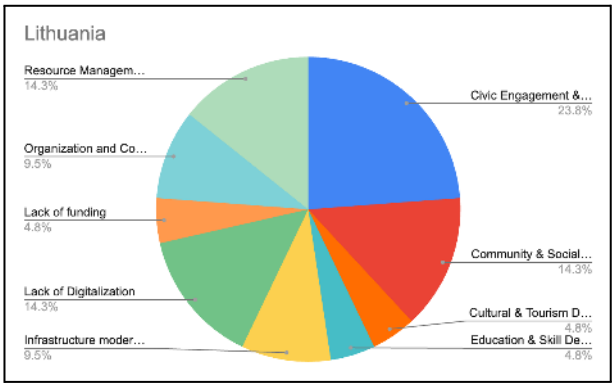
- In Finland, the most significant challenges are **community and social well-being** (23%), and **civic engagement and participation** (15%), highlighting a strong focus on social cohesion and civic involvement.
- Poland faces significant challenges in **urban transportation and traffic management** (18%), as well as a **lack of digitalization** (23%), suggesting critical issues in technological integration and urban infrastructure.
- Lithuania's primary challenge is **civic engagement and participation** (23%), alongside concerns about **community and social well-being (14%).**
- In Latvia, **civic engagement and participation** is the leading challenge (26%), with significant concerns also in **community & social well-being** (13%), and **environmental & sustainability** (11%).
- Estonia's top challenges are **environmental and sustainability** (23%), as well as **community and social well-being** (20%), reflecting the importance of environmental concerns and social welfare.

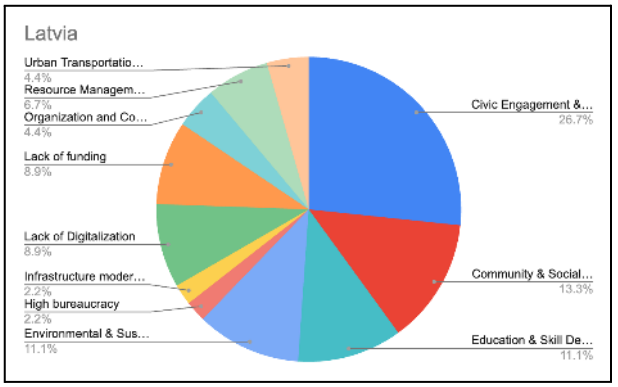
Despite the different focuses across the region, civic engagement and participation, as well as community and social well-being, are common challenges, while environmental sustainability and digitalization also emerge as critical areas of concern. To make sure that targeted interventions and policy choices meet the most pressing needs in each situation, it is important to understand the problems that are unique to each country.

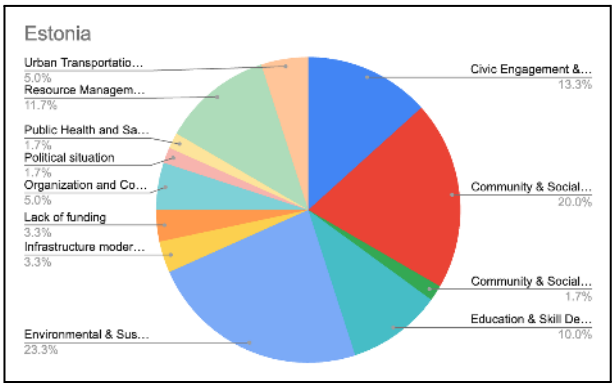
Table 3. The country profile of challenges collected for the hackathon.











3.5 Module 4: Immersive, Intelligent, and Innovative Solutions Implementation in BSR

3.5.1 Introduction to Module 4

This module represents the culmination of our exploration into the advancements and applications of technology within the public sector, specifically focusing on the Baltic Sea Region. It is designed to provide a comprehensive and strategic overview of the readiness of public sector organizations (PSOs) in the BSR to adopt and implement immersive, intelligent, and innovative solutions, exemplified through virtual reality (VR), augmented reality (AR), and extended reality (XR).

The first question (see Figure 16) in the module survey findings provides a picture of PS's existing use of immersive technologies. A small 15% of the studied organizations have implemented immersive/intelligent solutions for purposes such as teaching and increasing public involvement. In contrast, a sizable 50% have not integrated this technology into their operations. Most tellingly, 35% of respondents were unsure about their organization's involvement with these technologies, indicating a potential lack of clear communication, awareness, or strategic deployment inside their firms. These results show how important it is to have a customized plan in Module 4 to close the knowledge gap and get the PSP ready for implementing new technical solutions.

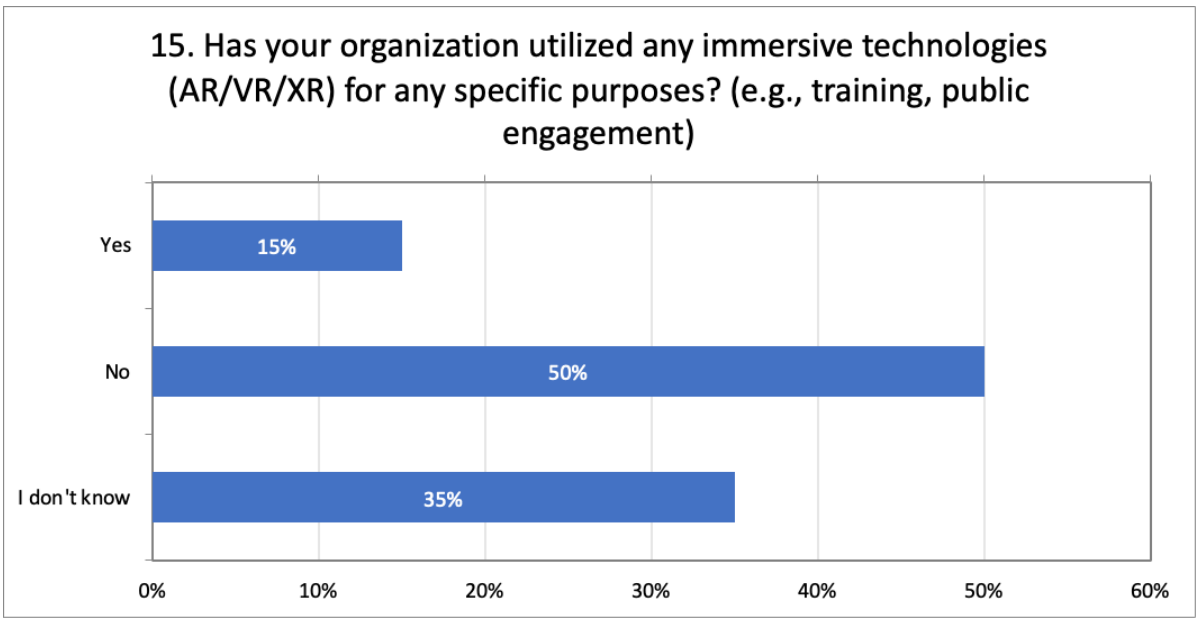


Figure 16. The PS's existing use of immersive-intelligent technologies.

3.5.2 If the person answer “Yes”

In an open-ended element of the surveys, where participants were free to describe their experiences in their own words, a wide range of new applications of immersive technologies emerged across public sector organizations. Utilization covered everything:

- From improving commercial events with futuristic insights for entrepreneurs to exploiting academic relationships, such as those with LUT / LAB, demonstrating a mix of practical and research-oriented uses.
- Other significant uses included engaging communities in urban planning using virtual reality and encouraging public participation in public spaces.
- Museums have started to experiment with these technologies, but their application is still limited.
- Artificial intelligence and XR technologies have made their way into public events and academia, with Vidzeme University's VR Lab in Latvia at the forefront of practical research.
- Spatial planning initiatives are using tools such as the Virtual Green Planner and Urban Tempo to update urban management, with a focus on smart Urban Digital Twins.
- The building and tourism industries suggested using Participatory Hub efforts and immersive project activities to enhance stakeholder participation and user experience.
- Innovations such as the creation of virtual shelters demonstrate a forward-thinking approach to safety and training.

However, integrating AR, VR, and XR technologies has not been without its obstacles. Respondents freely mentioned barriers such as a lack of information and bureaucratic red tape, limited skills inside organizations, financial limits, and low levels of public engagement. Impediments included identifying appropriate opportunities and attracting expertise. We identified technological constraints, particularly for outdoor applications, and a general lack of awareness of the full benefits of XR technologies among administrative personnel, emphasizing the need for more comprehensive education and development in these areas.

Furthermore, issues like the need for a qualified workforce, the development of appropriate legislative frameworks, the establishment of public trust in AI systems, and the assurance of

security and durability are crucial. This open inquiry style provides deep, unfiltered insights into the state of immersive technology adoption and the various challenges that enterprises are facing.

3.5.3 If the person answers “No”

The survey also examined organizations' readiness to interact with immersive technology if they had the necessary knowledge and opportunity. The bar chart below (see Figure 17) demonstrates respondents' innovative attitudes: 35% expressed an interest in trying out AR, VR, or XR technologies if they had the necessary information and chance. This indicates an openness to innovation and an understanding of the potential value these technologies may provide. However, even in ideal settings, just 8% demonstrated little interest in studying these choices, potentially due to factors such as company culture, perceived relevance, or resource constraints. Surprisingly, a significant 57% were unsure, indicating a sizable pool of firms that could be open to immersive technology if given more knowledge and favorable conditions. This data emphasizes the crucial need for educational activities and accessible chances to realize the full potential of immersive technologies in improving public service delivery.

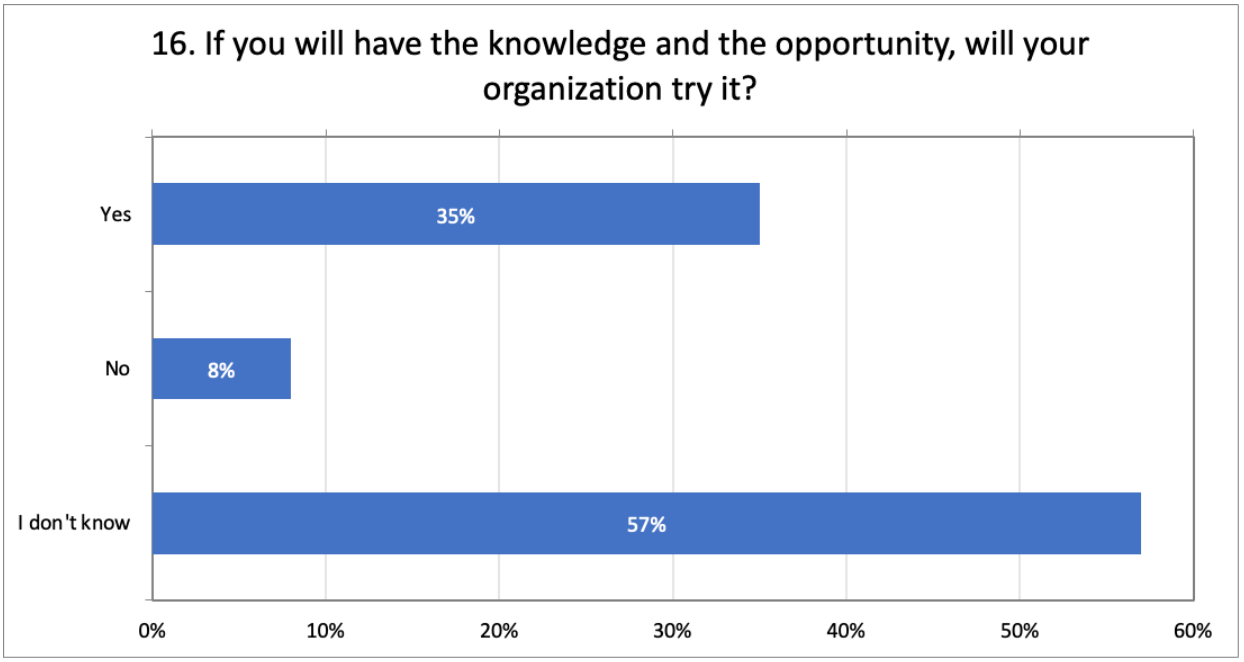


Figure 17. The readiness to implement immersive-intelligent solutions.

The collection of 37 contacts from organizations interested in studying and implementing immersive technology is a positive outcome of the survey phase. It represents a tangible interest in the industry and lays the groundwork for the formation of a collaborative network ready to delve deeper into the worlds of AR, VR, and XR. These contacts represent a broad range of potential: organizations on the edge of technological adoption, focused on embracing innovation and expanding their services.

Their participation is more than just a survey success indicator; it is also a step toward creating a community that will shape the future of public service delivery. It establishes the framework for a succession of educational efforts and pilot projects, with each group bringing its own perspective and set of expectations to the table. This shared interest is an encouraging sign of a larger trend toward digital transformation and a proactive approach to embracing the promise of new technology.

3.5.3 If the person answers “I do not know”

The survey's layout effectively directs respondents who are unsure about the use of immersive technology to consider potential applications within their organizations. The survey fosters a positive discussion by prompting individuals who answer "I don't know" to inquire further about the potential applications of these technologies. This method not only educates and inspires the use of AR, VR, and XR technologies, but it also helps to collect useful data on perceived impediments or knowledge gaps in the public sector. In addition, it can elicit fresh ideas from a wide spectrum of respondents, who may see novel applications for these technologies in their own setting. This phase is critical because it fosters a culture of curiosity and possibilities, paving the way for a more informed and visionary adoption of immersive technology in the future.

3.5.4 Area of implementation of immersive-intelligence solutions

The bar chart displays respondents' thoughts on the possible influence of immersive intelligent solutions and artificial intelligence in a variety of public domain sectors (see Figure 16). Education and training are areas where new technologies could have the greatest influence, with 64% of

respondents recognized this possibility. More than half of respondents recognized the potential of public engagement, communication, urban planning, and infrastructure management. Tourism follows closely, indicating a strong interest in applying these technologies to encourage people to visit new places.

Respondents acknowledge that areas such as administrative and back-office functions, transportation and traffic management, social services, and welfare appear to have a smaller projected influence. Respondents also identified healthcare and telemedicine, environmental conservation and management, and public safety and emergency response tasks as key areas of impact, but not on the front lines. This demonstrates their comprehensive comprehension of the significant impact the solutions will have on a wide range of public service areas. This data provides valuable insights into the areas that immersive and intelligent technologies should focus on, indicating fertile ground for innovation in various sectors.

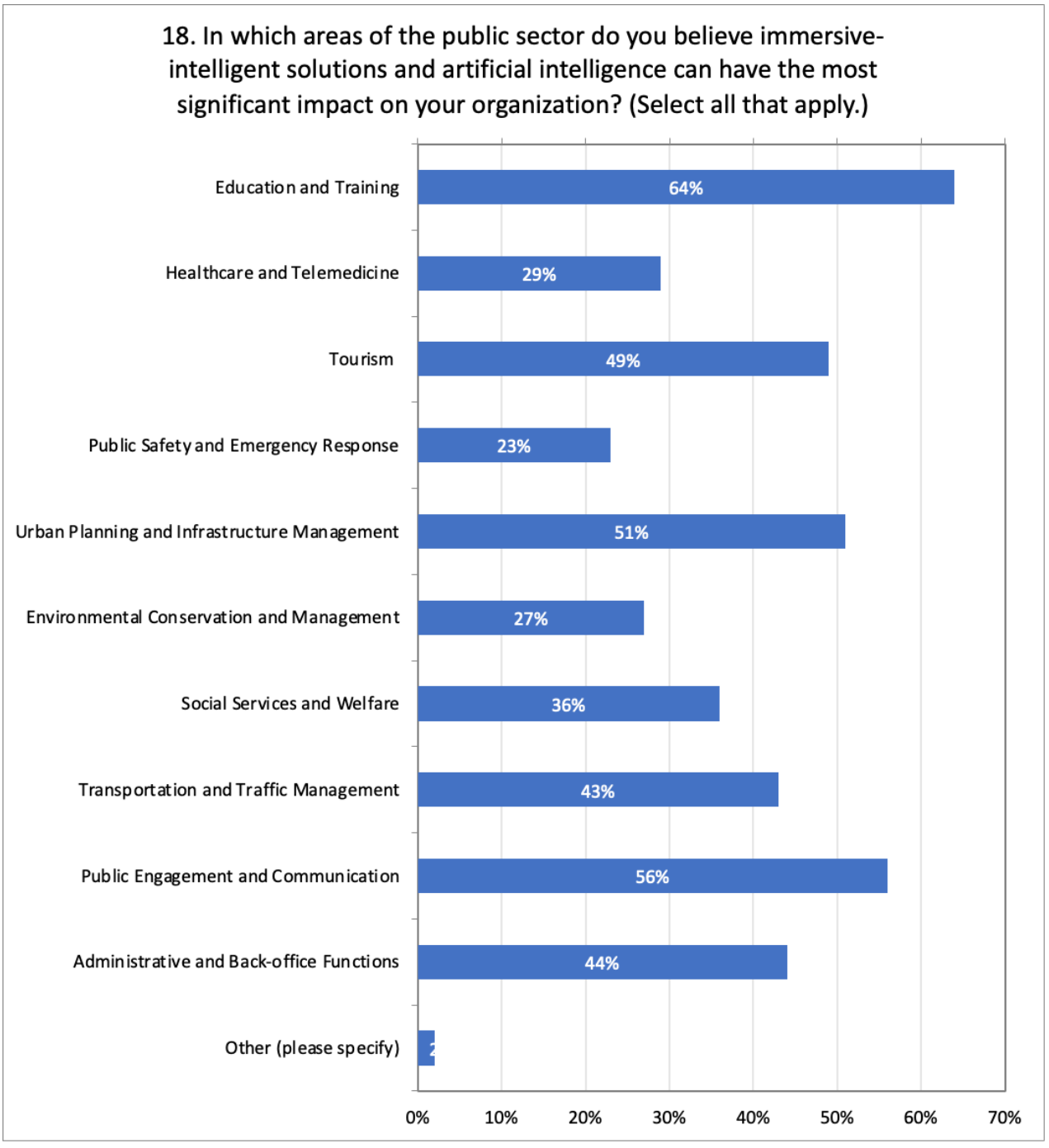


Figure 16. The areas for implementing immersive-intelligent solutions.

3.5.5 Final thoughts about future

Respondents provided a broad and optimistic perspective for the future application of immersive intelligent solutions and artificial intelligence in public organizations. Many anticipate a significant spike in the usage of these technologies, which correspond to the "one window" philosophy, aiming to expedite operations and bring governmental services closer to citizens. Respondents believe that digital opportunities will simplify daily responsibilities and increase capacity, accessibility, and information flow, resulting in more efficient public service delivery.

Innovative processes are projected to develop and be adopted throughout the public sector, as strategic development and financial backing expand. Education services are viewed as having enormous potential for employing these technologies to organise public places and improve learning. Despite the fact that some responders are still confused about the specifics, municipal documents make an honest acknowledgement of the function that these technologies will play.

We expect the translation of everyday processes to AI, the facilitation of convenient remote work, and increased use in education and tourism for district development. We expect the development of policies governing the use of these technologies, with a focus on educating government employees about their benefits. Respondents envision a future in which services run more efficiently, information is more easily available, and employees can do more tasks in less time.

Significant educational advancements have identified immersive learning environments and personalized learning with AI. Predictive analytics in urban planning, infrastructure monitoring, and the introduction of smart city technologies all indicate a shift toward more intelligent urban administration. Experts predict a dramatic increase in the use of drones for data collection (*Drones and Their Role in A Data-Driven Future*, 2021).

However, some express a cautious or wait-and-see attitude due to a lack of expertise, while others are concerned about the loss of the human touch and reliance on giant global IT businesses (Anderson & Rainie, 2018). Despite these worries, the consensus envisions a future in which AI and immersive technology become natural components of life, boosting service delivery, enabling better public service design, and potentially displacing numerous businesses.

People clearly expect these technologies to not only transform service delivery, but also necessitate a shift in workforce skills and public policy for equitable and ethical adoption. The respondents' sentiments point to a future in which immersive and intelligent solutions are not simply ancillary tools but intrinsic components of public service infrastructure, influencing the very fabric of public sector interaction with society.

Summary of Module 4

Module 4 of our survey evaluated the readiness and vision for integrating immersive intelligent technologies and artificial intelligence into public sector organizations. We conducted an investigation into the current utilization of these technologies, the willingness to adopt them given sufficient knowledge and opportunity, potential repercussions across various sectors, and the overall future vision.

Here is a summary of the main findings and attitudes from Module 4:

- **Only 15%** of respondents use immersive technologies, indicating tremendous room for growth in this field.
- A significant 35% of respondents said they would be willing to explore immersive technology if given the right knowledge and opportunity, indicating a desire for innovation.
- The primary sectors identified for the influence of these technologies were **education and training, with public engagement and communication** also receiving attention.
- The identified obstacles include a **lack of information**, **competence, and financial resources,** as well as the need for **strategic development** and the **removal of bureaucratic impediments.**
- Respondents envision a future in which AI and immersive technologies improve public services, making them more **efficient, accessible, and user friendly.** There is optimism for greater independent development of these technologies within local contexts, as opposed to reliance on global tech behemoths.

Overall, the module provided a cautious but positive outlook on immersive and intelligent technology in the public sector. There is a recognized need for education and strategic planning to assist adoption, as well as a clear vision of these technologies' transformative potential to improve public service delivery and citizen participation.

4 Discussion

The systematic survey across the Baltic Sea Region (BSR) focuses on the multifaceted terrain of public sector innovation, showcasing a variety of organizational features, technical readiness, and a wide range of social innovation prospects. This study, which includes results from Estonia, Latvia, Lithuania, Finland, and Poland, serves not only as a barometer for present innovative practices but also as a lighthouse to guide future public service improvement efforts. The participation and response rates across these countries give a foundational understanding of the various degrees of involvement and interest, paving the way for further investigation of the findings and their consequences.

4.1 Results overview

The survey results, organized into modules, provide a kaleidoscopic view of innovation in the BSR's public sector. The findings, from identifying major innovation instances to assessing readiness for integrating immersive intelligent technology, highlight an area on the verge of substantial disruption. The innovation environment, as seen through Module 2's insights, reveals a landscape where effective communication and institutional support are lacking. This contrast shows both the chance for growth and the significance of strategic concentration in order to make the most of all creative abilities.

Module 3 looks into the serious concerns facing cities and municipalities, highlighting the need for civic involvement and social well-being improvements. The detailed assessment of these difficulties, based on community feedback, emphasizes the importance of targeted social innovation efforts. Addressing these challenges through creative problem-solving projects such as social hackathons has the real potential to inspire community-wide innovation, promote sustainability, and stimulate educational and economic progress.

The survey's final module focuses on the technological frontier, demonstrating a cautious yet optimistic attitude about the adoption of immersive and intelligent technologies. Despite their current limited use, the expressed enthusiasm to investigate these technologies demonstrates a forward-thinking perspective. This readiness, along with the identified sectors for potential impact and the obstacles to overcome, creates a road map for incorporating technological

advancements. advancements into public services—imagining a future in which public services are not only more efficient and accessible but also more responsive to the needs and expectations of the community.

By weaving together various strands of data and ideas obtained from the survey for PSP and PSA, an overarching narrative emerges of a region on the trajectory of a transformative leap in public service innovation. This journey, characterized by varying response rates and levels of engagement across countries, presents a combination of difficulties, desires, and opportunities that define the present-day situation. As the survey results overview concludes, it is clear that the region's public services face both challenges and opportunities. By accepting the survey's evaluations and lessons, there is a clear potential to spark a move toward more innovative, inclusive, and responsive public services. This is more than just a reflection of potential; it is a clear call to action for all stakeholders concerned. A cooperative, strategic, and forward-thinking approach is necessary for the future that this survey envisions—one in which technology, creativity, and community needs interact to reshape public service. As we stand now, the survey results serve as both a testament to the work done and an example for the transformative journey ahead, offering a vision of a Baltic Sea Region in which public service innovation not only thrives but leads the way in shaping a more connected, sustainable, and inclusive society.

Next steps and further Implementation

As we go beyond the insights gained from our thorough assessment of the Baltic Sea Region's public services landscape, we focus on turning these findings into observable initiatives for stimulating innovation and improving public sector performance. Our conclusion, acknowledging the challenges and possibilities revealed by our analysis, establishes a roadmap for implementing research, guaranteeing that the study's momentum propels substantial transformation.

We intend to use a range of platforms and media to communicate valuable insights and build a culture of shared learning and creativity. We will fulfill this commitment by implementing the following roadmap:

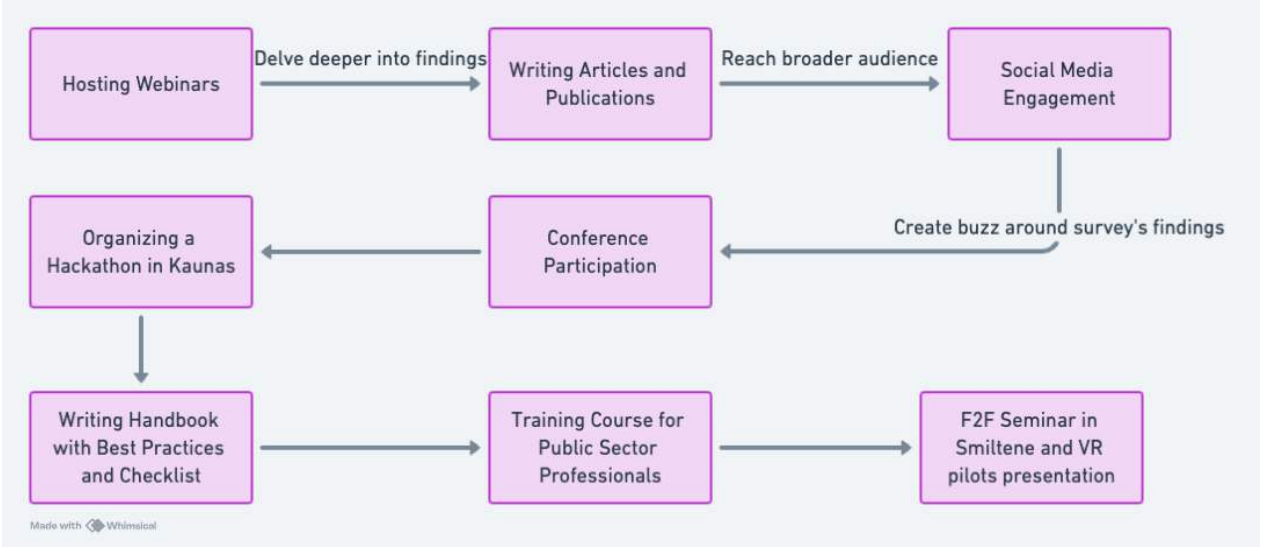


Figure 17. The roadmap of planned activities (March, 2024).

Before continuing on these exciting next stages, we would like to extend our sincere thanks to everyone who participated in and supported the survey. All contributions have been invaluable in providing a thorough overview of the innovation environment in the BSR's public services. Your participation, views, and support have not only enriched this study but have also created the framework for future advances and joint endeavors.

Finally, based on the findings of our poll, the journey ahead will be one of collaboration, creativity, and transformation. By strategically disseminating information, engaging stakeholders, and developing practical resources, we aim to make a substantial difference. With the ongoing support and engagement of our dedicated community, we can transform today's issues into tomorrow's successes, assuring a brighter future for public services throughout the BSR.

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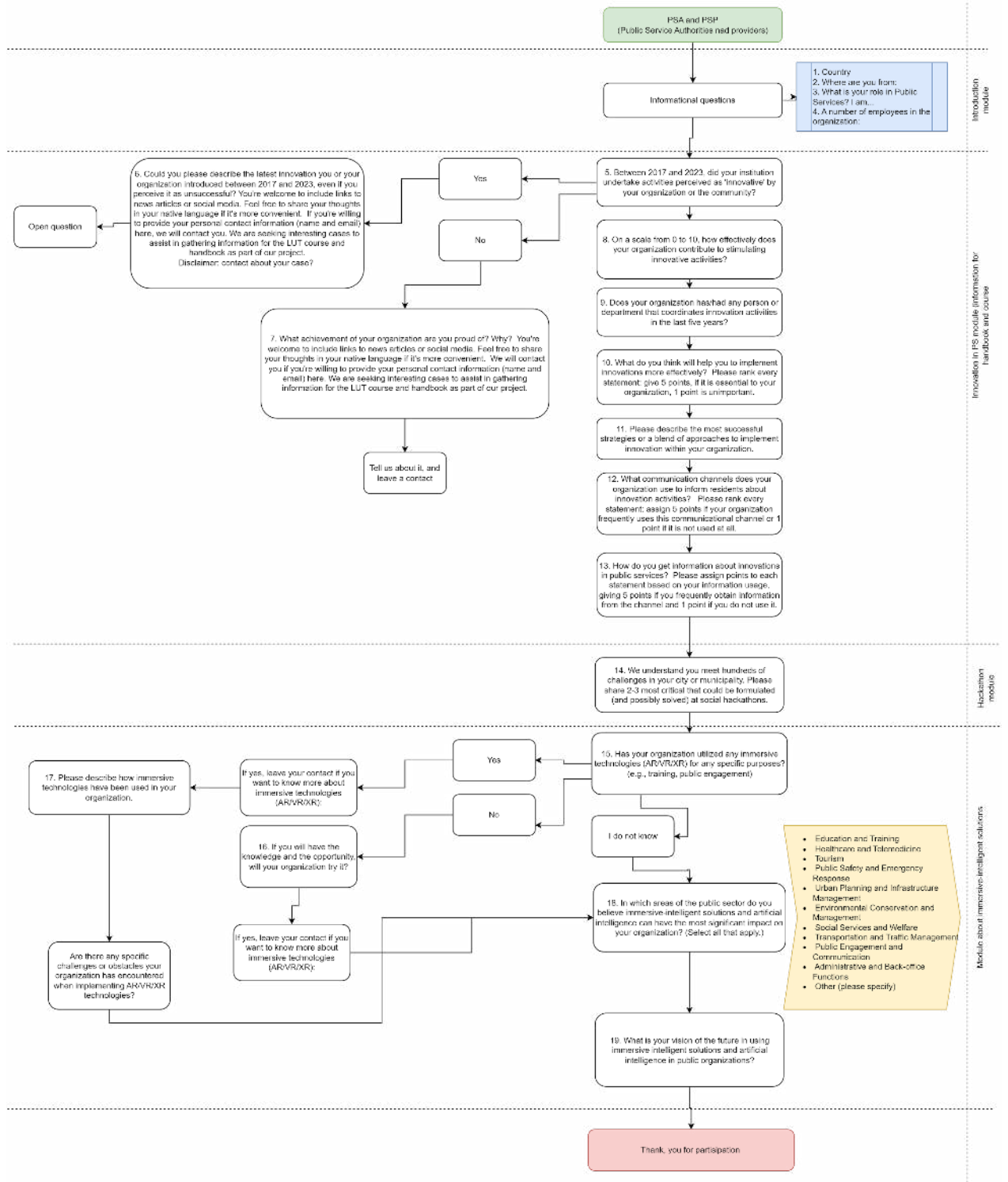
Appendix 1. The decision tree of PSA and PSP Survey during the designing stage.



Appendix 2. Cover letter in English

Dear [Participant's Name],

I hope this letter finds you well. I am Katriin Vannik, a LUT University (Finland) junior research assistant. I am inviting you to participate in our important research study. Your involvement in this research is of immense significance, and your input will greatly contribute to understanding difficulties and challenges in public service practices. This research is carried out within the framework of the INTERREG BSR project -- 3I solutions for PS.

You can read more about our project here.

The survey link is here: https://link.webropol.com/s/surveyfor3IsolutionsforPS

Our survey aims to help identify the main pain points of innovation in the public sector. Based on this research, additional materials and reports will be created to help specialists successfully implement innovations in the Baltic Sea Region. Your perspective and experiences could be instrumental in achieving these goals. Your participation in this research will help us gather valuable insights and data to benefit our study and contribute to a broader understanding of the main challenges in implementing innovations in the public sector.

Participation in this research involves completing a survey. It will take approximately 10-15 minutes to complete. Rest assured that your responses will be kept strictly confidential, and any personal information you provide will be anonymized to ensure your privacy.

We understand your valuable time and sincerely appreciate your willingness to consider this request. To express our gratitude for your participation, we will invite the most active participants in the survey to a f2f seminar, which will take place in Smiltene (Latvia). The seminar will include training, the exchange of experience, and the opportunity to see with your own eyes a ready-made innovative solution that we will implement as part of our project.

Should you have any questions about the study or want additional information, please do not hesitate to contact me at katriin.vannik@lut.fi or anna.kruzenstern@lut.fi. I will respond to your inquiries promptly.

Thank you for your time and consideration. We look forward to your participation in our survey.

Sincerely,

Appendix 3. Survey questions

3I solutions in PS_LUT Survey for PSP and PSA.pdf

Appendix 4. The summary table of cases provided by respondents.

Cases from BSR

Appendix 5. The summary table of all challenges facing the cities and municipalities.

Challenges for Hackathone