Digital competencies for municipalities – Findings from Switzerland as a role model for smart regions within the European Union member states

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Abstract
The study shows that e-government services, cybersecurity and digital document management have been identified as key priorities for digitization in Swiss municipalities, which is crucial for the development of smart regions. This study aimed to assess the needs for certified digital competencies among decision-makers in small Swiss municipalities and cities. It sought to identify relevant digital transformation topics, required competencies, recruitment practices, training needs, and collaborations. While smart city initiatives have gained traction in larger urban areas, less attention has been paid to digitalization efforts in smaller municipalities. This study helps to fill that gap examining the specific needs and challenges of smaller Swiss communities. An online survey was conducted among 1,221 German-speaking Swiss municipalities in February 2024, with 215 responses (17.6% response rate). The survey covered topics such as digital transformation priorities, competencies, recruitment, training needs, and partnerships. Key findings include: E-government services, cybersecurity, and digital document management were top digitalization priorities; 61% of municipalities have a person responsible for digitalization efforts; Personal competencies like curiosity and willingness to learn were highly valued; Only 32% use competency-based job profiles in recruitment; There is significant interest in further training on digital transformation topics. The results highlight the need for targeted training and competency development for digitalization leaders in smaller municipalities. They also reveal opportunities to improve recruitment practices and leverage partnerships. This study provides valuable insights to inform the development of tailored training programs and competency frameworks for digital transformation in small Swiss municipalities. It contributes to the broader smart cities literature by examining the unique needs of smaller communities often overlooked in urban-centric research.

Keywords: organizational transformation, IT-provider, job profiles.

1. Introduction
The digital transformation poses major challenges for local governments. Small and medium-sized municipalities in particular are confronted with the need to digitize their services and at the same time build up the necessary skills [1]. This development is closely linked to the concept of the "Smart Region", which aims at data-based and networked regional development. This article examines how digital skills are assessed in Swiss municipalities and to what extent they can contribute to the development of smart regions for member states of the European Union as well.

The provision of digital services in municipalities is associated with a variety of challenges. This includes technical aspects such as the implementation of suitable IT infrastructures, but also organizational and personnel issues [264]. The study, conducted by Ege et al.

(2024) [1], identifies key issues that concern Swiss rural communities in the context of digital transformation. These can be divided into four categories:

- Data protection and information security;
- E-government and digital citizen services;
- Digital infrastructure and networks;
- Process optimization and increased efficiency.

These topics illustrate the complexity of the tasks that municipalities are confronted with. At the same time, it shows that only 61% of the municipalities surveyed have a person centrally responsible for digitization issues [1]. This underlines the need for clear responsibilities and specific competencies for digital transformation.

2. State of research

The digitization of municipal administrations has increasingly become the focus of research in recent years. Studies show that smaller municipalities in particular face challenges in implementing digital solutions [3]. The challenges are manifold: limited financial resources, a lack of specialist staff and an often still inadequate digital infrastructure inhibit the transformation process. At the same time, digital technologies offer enormous opportunities for more efficient administrative processes, better citizen services and innovative solutions to municipal challenges.

The transformation of municipal administrations requires more than just technical infrastructure. Successful digitization requires a holistic approach. This means not only the implementation of new technologies, but also the development of a digital organizational culture, continuous training of employees and a strategic orientation that puts the needs of citizens at the center. At the same time, the importance of digital skills for a successful transformation is emphasized [264]. These include not only technical skills, but also the competence to use digital technologies strategically and user-oriented. Especially in rural regions, it is clear that the development of such skills is a decisive success factor [266].

Among smart cities, the city of Zurich occupies a top position in the Smart Cities ranking [5]. However, this also offers the opportunity to learn from their experiences and to adapt best practice examples. The importance of inter-municipal cooperation and the exchange of experiences are becoming increasingly important [268]. Networks and collaborations can help to pool resources, share knowledge and develop solutions together. For smaller municipalities in particular, this offers the opportunity to make digitization processes more effective and cost-effective. In the context of smart regions, the networking of different actors and the data-based control of regional development processes are discussed [7].

The networking of various municipal actors seems to be a key element for successful digitization strategies. Digital skills play a key role in harnessing the potential of new technologies for regional development [8]. Future research and practice must increasingly address the question of how digital skills can be systematically built up and digital transformation processes can be made sustainable. The digitization of municipal

administrations is not a one-off project, but a continuous development process that requires flexibility, willingness to learn and strategic thinking.

3. Empirical methodology

The present study is based on a secondary analysis of the study on digital literacy in Swiss municipalities conducted by Ege et al. (2024) [1]. To deepen and contextualize the results, a systematic literature analysis was conducted, which was evaluated using the science mapping method according to Pessin et al. (2023) [9].

Science mapping enables the clustered representation and analysis of scientific literature to identify research trends and relationships between different concepts. The following steps were carried out for the present study:

- Systematic literature research in relevant databases (Web of Science, Scopus);
- Data cleansing and preparation;
- Creation of co-citation and co-word networks;
- Cluster analysis to identify central topics;
- Visualization and interpretation of the results.

The analysis in the present case revealed four central thematic clusters:

- Digital skills in public administration;
- Smart City and Regional Governance;
- E-government and digital service provision;
- Data management and analysis for smart regions.

These clusters form the basis for the development of the process model for data-based regional development.

4. Results

The results of the study by Ege et al. (2024) provide important insights for the development of smart regions in Switzerland [1]. The interpretation of the data reveals several key areas that are important for the progress towards smart regions:

4.1. Digitalization priorities and smart governance

The study identified e-government services, cybersecurity and digital document management as top priorities for digitization in Swiss municipalities. These priorities are fundamental for the development of smart regions:

- E-government services: The prioritization of e-government services points to a paradigm shift in administration. Smart regions are characterized by efficient, citizen-oriented digital services. The focus on this area lays the foundation for improved interaction between citizens and administration, which is a core element of smart regions.
- Cybersecurity: The high priority of cybersecurity shows an awareness of the risks of digitalization. This is crucial for smart regions, as increasing connectivity and

data use also bring new security challenges. Robust protection of digital infrastructures is essential for citizen trust and the stability of smart systems.

- Data management: The emphasis on digital document management indicates efforts to increase efficiency and optimize processes. In smart regions, the efficient management and use of data and information is central to data-based decision-making processes and the improvement of services.

4.2. Responsibilities and competencies

The fact that 61% of municipalities have a person responsible for digitization is a positive sign for the development of smart regions. These leaders can act as change agents and drive digital transformation. However, the fact that 39% of municipalities do not have such position points to potential challenges, especially for smaller municipalities.

The high value of personal skills such as curiosity and willingness to learn underlines the importance of an agile and adaptable administrative culture. This is essential for smart regions, as they are in a constant state of change and depend on innovation. The ability to quickly grasp and implement new technologies and concepts is a key factor in the success of smart regions.

4.3. Recruitment and management of competencies

The low use of skills-based job profiles (only 32%) in recruitment indicates a potential for improvement. For smart regions, it is important to specifically attract skilled workers with the right skills. The development and use of detailed competency profiles could help to define the skills needed for smart regions more precisely and attract appropriate talent.

Interestingly, there is a correlation between the size of the municipality and the use of requirement profiles, with larger municipalities using them more frequently. This could indicate that smaller municipalities need support in the development and implementation of such HR tools in order to compete for qualified specialists.

4.4. Continuing education needs and skills development

The significant interest in continuing education on digital transformation topics is a promising sign for the development of smart regions. It shows the willingness of administrative staff to deal with new technologies and concepts. For smart regions, continuous learning and the constant development of skills is essential to keep up with technological progress and implement innovative solutions.

The study indicates that there is a need for further training, especially in the areas of process optimization, data protection and information security, as well as e-government and digital citizen services. These topics are central to the development of smart regions, as they form the basis for efficient, secure and citizen-oriented digital services.

4.5. Implications for the development of smart regions

The results of the study suggest that Swiss municipalities are aware of the importance of digital transformation and are taking the first steps towards smart regions. However, there

are also challenges and potential for development. The results outline the survey results regarding required skills and resources for digital transformation leaders in Swiss municipalities. It focuses on the most relevant topics, skill needs, recruitment strategies, educational formats, and cooperative efforts among municipalities and IT service providers.

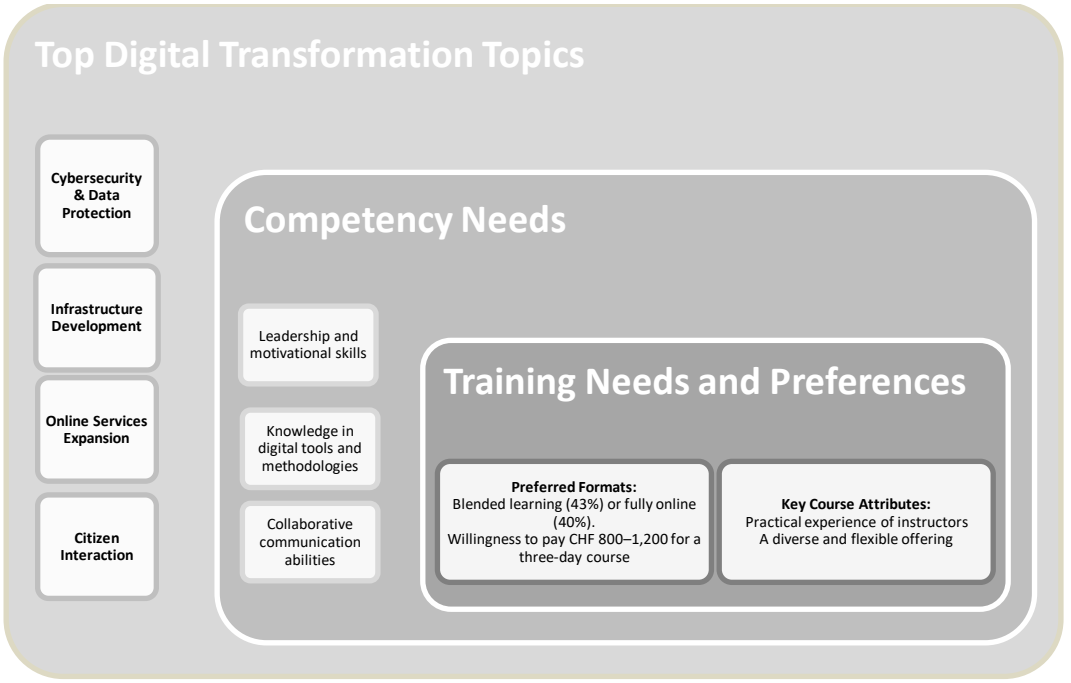

Fig. 1. Resources for digital transformation leaders.
Source: Author's own work

The findings emphasize a strong demand for targeted education in digital transformation, especially in smaller municipalities. Developing competency-based training programs with flexible formats and practical focus will address skill gaps while being resource-efficient for participants. Collaboration between municipalities and IT providers can further enhance shared knowledge and reduce financial strain through joint solutions.

This evidence points to an actionable opportunity for establishing scalable, high-impact training solutions to empower digital transformation leaders across municipalities. Based on these findings, focus areas for the development towards data-based foundations for the development of smart regions can be derived:

- Capacity building: There is a clear need for targeted capacity building in the areas of digitalization and innovation. Training programs should be tailored to the specific needs of communities of different sizes.
- Strategic workforce development: The introduction and use of competency-based requirement profiles could improve strategic workforce development and help attract and develop the talent needed for smart regions.

- Inter-municipal cooperation: In view of the challenges for smaller municipalities, increased inter-municipal cooperation in the field of digitization could pave the way to smart regions. This could enable the exchange of resources and expertise.
- Holistic approach: The development of smart regions requires a holistic approach that integrates technological, organizational and social aspects. The identified priorities (e-government, cybersecurity, document management) should be embedded in a comprehensive digital strategy [10].
- Cultural change: The appreciation of skills such as curiosity and willingness to learn points to the need for a cultural change in administration. Smart regions require an agile, innovative administrative culture.

5. Development of a process model

Based on the results of the study by Ege et al. (2024) and the science mapping analysis carried out, a process model for data-based regional development is proposed in the following [1]. The model consists of five phases:

1. Competency Exploration and Development
2. Digital Infrastructure and Data Management
3. Service Design and Process Optimization
4. Networking and Cooperation
5. Data-based Management and Evaluation

These are explained in more detail below:

5.1. Competency exploration and development

Various competencies for digital transformation can be derived as relevant. These include, in particular:

- Technical understanding of data management;
- Project management in complex data science projects;
- Change management to combine administrative routine and innovation projects in a smart environment;
- Data protection and information security of public institutions.

It is crucial for municipalities to systematically build up and further develop these competencies. This can be achieved through targeted training measures, the establishment of internal networks of experts and cooperation with external partners.

5.2. Digital infrastructure and data management

A high-performance digital infrastructure forms the basis for smart regions. These include:

- Broadband expansion and 5G networks as well as early 6G test fields;
- Cloud solutions for municipal administration (SaaS-first strategy);
- Implementation of IoT sensors for data collection via uniform standards;
- Development of data platforms and management systems including forms of visualization.

Municipalities should develop a strategy for building and developing their digital infrastructure that also takes into account aspects of data management and data governance.

5.3. Service design and process optimization

Digitization offers potential for the redesign of municipal services and for the optimization of internal processes. Important aspects are:

- Development of user-centric digital services and ongoing development;
- Process analysis and optimization and workflow modules in productivity tools;
- Implementation of e-government solutions and smart regions solutions alike;
- Promotion of digital participation, also in three-dimensional space.

Municipalities should systematically analyze their services and processes and redesign them with the involvement of citizens and stakeholders.

5.4. Networking and cooperation

Smart regions are based on the networking of different players. The study by Ege et al. (2024) shows that collaborations play an important role [1]. The following aspects must be taken into account:

- Establishment of regional innovation networks with quality assurance of mentors;
- Inter-municipal cooperation on IT projects for knowledge sharing;
- Partnerships with research institutions and companies as well as involvement of civil society.

Municipalities should actively establish and maintain cooperation in order to use synergies and learn from each other. Models for subsequent use must also be developed for this.

5.5. Data-based management and evaluation

The use of data for evidence-based decisions is a central element of smart regions. The following steps are required:

- Building data collection and analysis capacities;
- Development of KPIs for regional development;
- Implementation of dashboards and visualization tools;
- Continuous evaluation and adaptation of measures to achieve goals.

Municipalities should develop a data strategy that provides for the systematic collection, analysis and use of data for regional development.

6. Conclusion

The present paper shows that digital skills are considered important in Swiss municipalities, but that their systematic development still has potential. In summary, the study by Ege et al. (2024) provides important insights into the current status and challenges of Swiss municipalities on their way to becoming smart regions [1]. It shows both progress and development potential and underlines the need for continuous investment in digital skills and infrastructure. For the successful development of smart regions within the European

Union, it will be crucial to strategically address the identified priorities, taking into account the specific needs and resources of municipalities of different sizes.

The proposed process model provides a framework for data-based regional development that can support municipalities in their transformation into smart regions.

Future research should focus on the practical implementation and evaluation of the model in different regional contexts. In this context, it is not necessary to focus more on centers and large municipalities, as has been the case in the past, but in particular the challenges of smaller municipalities must be taken into account, divided into size classes. In addition, ethical and social implications of digitization and data use should be given greater attention. The development of smart regions requires a holistic approach that integrates technological, organizational and social aspects. Digital skills ultimately form the foundation for a successful transformation, which can ultimately contribute to an improved quality of life and sustainable development in the regions.

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