Swiss Smart City Survey 2022

Final Report

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Summary

The Swiss Smart City Survey aims to assess the current status of smart city developments on a regular basis. Smart city trends and corresponding implementation activities in Swiss cities and municipalities are considered in order to provide the best possible support for smart city processes in Switzerland. Of the 170 invited Swiss cities and municipalities, 87 took part in the survey.

Cities that have already actively initiated the transformation process to a smart city have been divided into different development phases based on the criteria defined in the Smart City Guidelines (SFOE, 2019). Cities are either in the pilot phase, institutionalization phase or establishment phase. Most of the participating cities are either in the pilot project phase (50.6%) or not yet in any of the three phases (29.9%). Only 12.6% of the cities are in the institutionalization phase and 5.7% in the establishment phase.

Compared to the 2020 survey, there was an increase in smart city activities.

In 2022, the number of urban municipalities and cities that are not yet in a maturity phase decreased by 13%. The trend continues to be positive: an increasing number of cities and municipalities are developing a smart city strategy and creating smart city positions in the administration. The topic of smart cities is increasingly seen as important by cities and municipalities.

In cooperation with experts, a Smart City Index was developed in 2020. It is respectively calculated for each city/municipality. The index consists of 9 dimensions, which mainly correspond to the sub-areas of the Smart City Wheel and the architecture of the Smart City Hub Switzerland. In 2022, as in 2020, the focal points of smart city developments are "Smart Environment", "Smart People" and "Smart Living". In an open-ended question on existing smart city projects, concrete projects were categorized into Smart Economy, Smart Governance, Smart Environment, Smart Mobility, Smart People and Smart Living. The list of projects is intended to inspire cities in their smart city activities.
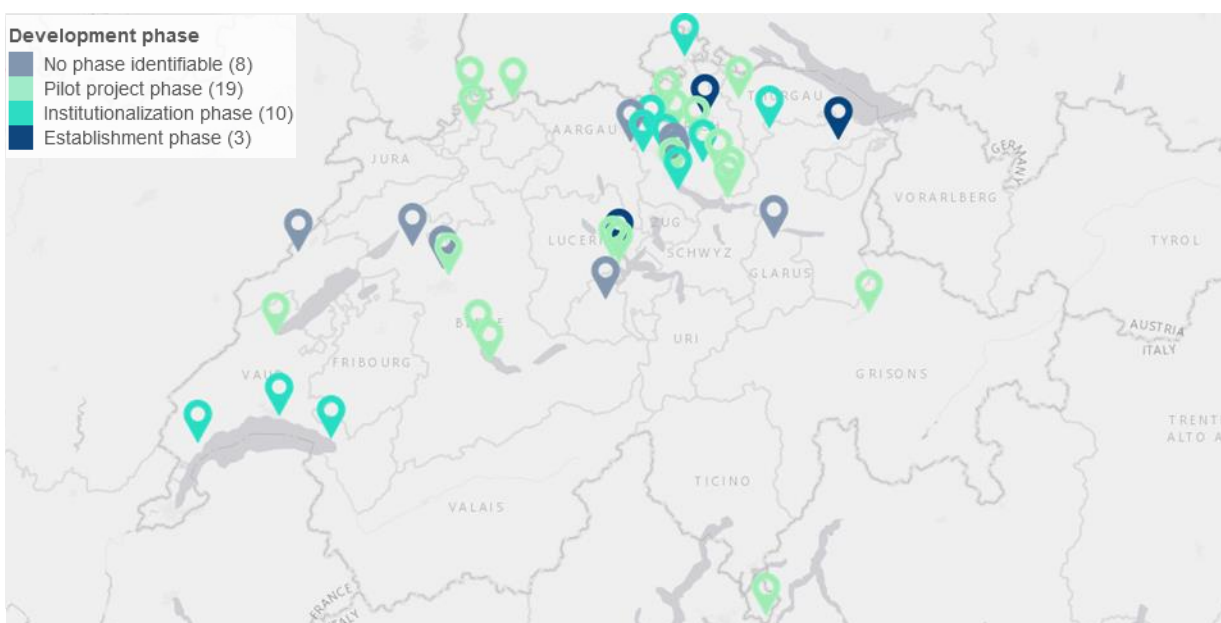
Figure 1:   Besides 47 cities that wish to remain anonymous, these 40 cities participated in the Swiss Smart City Survey 2022 (figure source: dashboard.smartcity-survey.ch).

A brief introduction to the survey

In Switzerland as well as abroad, activities in the field of smart city (SC) have been increasing over the past years. Although larger cities were mostly pioneers in the beginning, similar activities can now be observed in small and medium-sized cities. In Switzerland, the first pilot projects have already been launched and pioneering SC strategies have been adopted at the municipal level. Diese Entwicklungen spiegeln sich auch auf nationaler Ebene, wo verschiedene bestehende und neu gegründete Interessensvereinigungen oder Netzwerke das Thema aufgegriffen haben. Nevertheless, the development towards a smart city is still not very tangible for many and the various initiatives and platforms sometimes appear uncoordinated. Political decision-makers and implementation partners have expressed an interest in facilitating better overview, more coordination, and easier access to reference projects. The regularly conducted Swiss Smart City Survey is intended to help close this gap. It provides important information and a basis for decision-making for politics, administration and business at all levels.

The Swiss Smart City Survey was designed in a way that it can be conducted regularly every two years The periodic repetition of the survey is intended to track developments, needs and trends in the field of smart city over a longer period and to record changes over time. The survey is conducted online. The questionnaire contains closed and open questions and is standardised. This ensures the highest possible intertemporal comparability.

In the development and implementation of the Swiss Smart City Survey 2022, the ZHAW was supported by the following partners:

- EnergieSchweiz (Presenting Partner)
- Schweizerischer Nationalfonds (Gold P.)
- Schweizerischer Städteverband (Silver P.)
- SATW (Silver Partner)
- EKZ (Silver Partner)
- Deloitte (Silver Partner)
- Smart City Hub Switzerland (Silver Partner)
- Elektron (Silver Partner)
- SmartCity Alliance (Silver Partner)

In order to gain practical and relevant insights, the survey questionnaire was developed and reviewed in workshops where all partners were involved. The aim was to determine the current status of smart city development, trends and implementation activities in Swiss cities and municipalities. Furthermore, the current political conditions within public administration (actors, responsibilities, organization, designated positions, budget, involved parties / departments etc.) as well as the most important barriers and drivers for smart city development were evaluated. Particular attention was paid to capturing the needs of cities and communities in Switzerland in their transformation to Smart Sustainable Cities & Communities as well as in the implementation of SC solutions, so that technology developers, service providers, research institutions as well as policy and administration can address them more specifically.

The Swiss Smart City Survey is conceived for all cities and municipalities in Switzerland and is available in three languages: German, French and Italian. In the first two surveys in 2020 and 2022, the target group was limited to the 170 (respectively 171) cities and urban municipalities according to the FSO classification[1]. If desired, this circle can be extended to all municipalities in the future.

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[1] Definition according to FSO: core zone with at least 12,000 EBL [inhabitants, employees and equivalents from overnight stays], municipal area with at least 14,000 EBL).

Participants

The 170 considered cities and municipalities were invited to participate by e-mail. The contact address was, where available, the contact person of the Smart City Hub Switzerland, the Digitization Working Group or the general contact according to the list of members of the Association of Cities. The contact language was also adapted to the contact list of the Association of Cities. The majority of the data collection lasted from April to September 2022, with the very last participation in January 2023. It proved to be important to seek personal contact with the cities and municipalities in order to increase the participation rate. By means of telephone follow-up, about the same number of cities and municipalities were motivated to participate as after the first invitation, as shown in Figure 2 below.
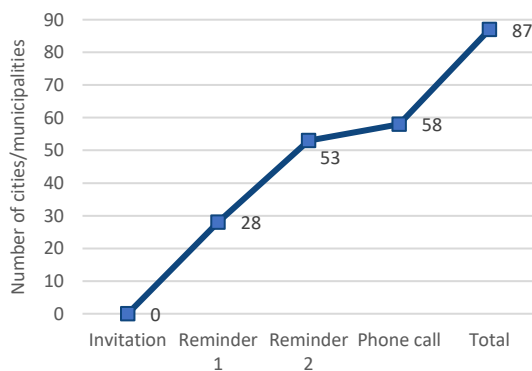

Figure 2: Participation by invitation phase.

A total of 87 out of 170 invited cities and municipalities participated in the survey and provided at least information on the organizational structure (participants who did not answer at least the questions on the organizational structure were not included in the evaluation). This results in a participation rate of 51% of all invited cities. The survey can be considered to be rather time consuming, since the cities required an average of 40 minutes to complete it. Taking this

into consideration, the participation rate is very good.

Looking at the regional distribution of the participating cities, they are spread all over Switzerland. This is also reflected in the breakdown by language as Figure 3 illustrates.
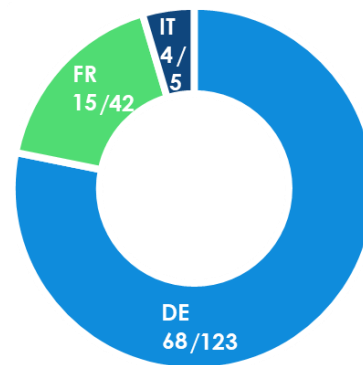

Figure 3: Participants by language.

Looking at the size and degree of urbanity of the cities, all categories are represented. From rural centers, where the community character dominates, to cities in large metropolitan areas, are all represented among the respondents. In order to better illustrate this and to enable greater comparability between the cities, 4 reference groups were formed. To form these groups, cities were classified according to the FSO's[2] community typology of 9 categories and were subsequently grouped. It is essential that at least 4 cities are represented in each of the comparison groups, so that any desired anonymity on the part of the cities can be ensured at all times.

The four reference groups of the Swiss Smart City Survey are as follows:

- Greater metropolitan area
- Mid-sized metropolitan area
- Individual cities
- Rural centers

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[2] https://www.bfs.admin.ch/bfs/de/home/statistiken/querschnittsthemen/raeumliche-analysen.assetdetail.2543279.html

The group «greater metropolitan area» compromises 38 cities in a large urban agglomeration, all of which belong to the FSO municipality type "Urban municipality of a large agglomeration (11)". The group "mid-sized metropolitan area" comprises 29 cities in a medium metropolitan area, all of which belong to the FSO municipality type "Urban municipality of a medium-sized agglomeration (12)". The group "individual cities" contains 18 cities in a small or without agglomeration, all of which belong to the FSO community type "urban community of a small or outside agglomeration (13)". The fourth group "rural centers" includes cities with a high density, but whose municipality character is dominant. In this group, two cities cities are assigned to the FSO municipality type "Peri-urban municipality of high density (21)" and none to the type "Rural center municipality (31)". Since only 2 municipalities of the category "rural centers" are represented in 2022, they were integrated accordingly into the next larger comparison group "'Individual Cities'".

Evaluation

Types of evaluation

The collected data of the Swiss Smart Survey are evaluated and published in different formats. In addition to this report, a website was created containing the main results: www.sc-survey.ch/en. It features an interactive dashboard that provides an overview of smart city developments in Switzerland. The user can select individual filters and aggregation levels, allowing the data to be viewed dynamically and interactively. In addition, the most important aggregated statistics were summarized in a presentation. For all cities that completed the survey, an individual smart city factsheet was also created, which provides detailed feedback on the respective state of development and compares it to similar cities (reference group). It supports cities in identifying their strengths and catch-up

potential and provides practical tips for the next steps on the way to becoming a smart city by using the ZHAW[3] Smart City Guide.

Swiss Smart City Index

In order to better represent the different aspects of a smart city as well as the developments over time, a Smart City Index was developed which is specifically suited for Switzerland. Based on the Smart City Wheel and the architecture of the Smart City Hub Switzerland[4], 8 dimensions of a smart city were defined. The index is supplemented by a 9th dimension, which takes the organizational and structural elements within the city administration into account. Overall, the index consists of the following 9 dimensions:

- **Smart Mobility:** Creating clean mobility and logistics, promoting efficient transportation, intermodality and sharing concepts.
- **Smart Environment:** Resource and environmentally friendly development of urban environments (buildings, public spaces, infrastructure systems), promotion of renewable energies and use of synergy potentials.
- **Smart Economy**: Establishment of an innovative, resource-saving and open economic system based on networking, cooperation, circular economy and flexible work models.
- **Smart People:** Utilizing and promoting the resources of the inhabitants and ensuring lifelong learning, participation, social integration and openness to creativity.
- **Smart Governance**: Intelligent, needs-oriented and transparent management of urban administrative processes and infrastructure as well as interaction between residents and the administration.
- **Smart Living:** Ensuring barrier-free, communal, safe and healthy living based on equal opportunities.

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[3] https://www.zhaw.ch/de/engineering/institute-zentren/ine/smart-city-leitfaden/

[4] https://www.smartcityhub.ch/smart_city_wheel.120de.html

- **Smart Data**: Collecting, processing, and using data in real time (Internet of Things, artificial intelligence, virtual reality, etc.) and ensuring cyber security.
- **Smart Infrastructure**: Establishment and maintenance of a modern ICT infrastructure as well as urban services and networks (supply and disposal, health, education, emergency organizations, structural measures in transport & traffic, etc.).
- **Enabler:** Formal anchoring of the smart city in the administrative organization, corresponding strategic goals, political mandates or designated budgets, which serve as drivers in the development of a smart city.

Each of the nine dimensions consists of 4-10 individual indicators, which were developed by the project consortium with all partners. In addition to the already existing projects and structures of a smart city, planned activities were also taken into account, albeit with less weight.

For the calculation of the dimensions, the indicators were weighted according to their importance. The weighting was carried out by a panel of 7 experts who deal intensively with the topic of smart cities. In the selection process, care was taken to ensure that the experts were as independent as possible, i.e. they do not work for a city or a company that offers smart city solutions. The experts therefore came from academia, associations, and public administration (excluding city representatives). The expert panel included people with a more technical background as well as those from the social sciences in order to avoid one-sided weighting of indicators. By means of a three-phase Delphi procedure, all indicators were thus weighted for the respective dimension. A maximum of 100 points can be achieved per dimension.
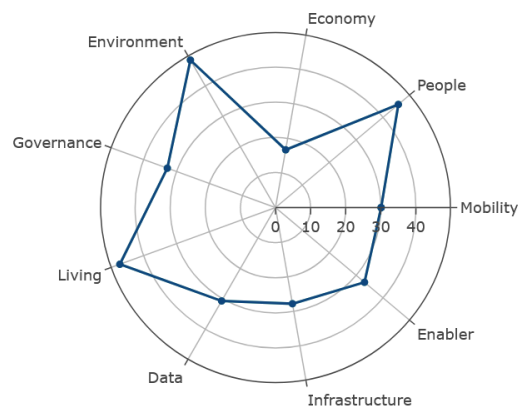

Figure 4: Characteristics of the nine dimensions of the Swiss Smart City Index (figure source: dashboard.smartcity-survey.ch).

The Figure 4 above shows the 9 dimensions of the Swiss Smart City Index on a scale of 0-50 out of the maximum achievable 100 points. The blue line represents the actual average achieved by all participating cities. Detailed results, such as a breakdown into the four reference groups, can be found on the website and in the presentation. Compared with the first survey in 2020, there is a slight overall increase in smart city activities in 2022. As in 2020, the focus is on the areas of "Smart Environment", "Smart People" and "Smart Living". A notable increase in activities can be seen above all in the areas of "Smart Data" and "Smart Governance".

The Maturity Phases

Besides the Swiss Smart City Index, the cities were also assigned to one of the three maturity phases of a smart city. The basis for this is provided by the Smart City Guide of the ZHAW, which present a dynamic development model of a smart city. Cities usually pass through the pilot projects phase, the institutionalization phase, and the establishment phase consecutively. The cities were assigned to the respective phases based on the key activities presented in the guide. In the case of the pilot projects and institutionalization phases, the diversity of variants presented in the guideline was taken into account, so that alternatives were also considered sufficient for certain activities (e.g. not every

city has to develop an SC strategy, SC goals can also be target-oriented).

The criteria for assignment to the establishment phase are very strict and must all be met, for the institutionalization phase the criteria must be partially met, and for the pilot project phase active engagement with the topic of smart city is enough. Thus, the transition in the first phases tends to be softer and more permeable, while the requirements for advanced smart cities are higher.
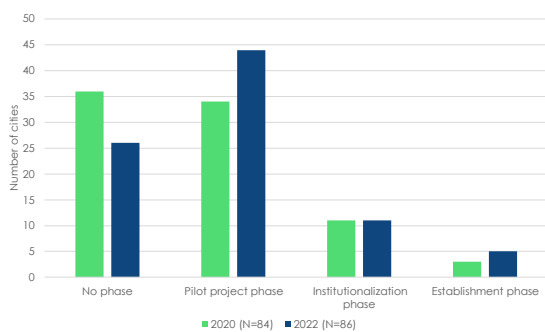

Figure 5: Number of cities/communities in the individual maturity phases in comparison 2020 with 2022.

In the allocation of cities to phases, the trend follows this respectively as shown in Figure 5. 26 cities/municipalities cannot yet be assigned to any phase, i.e., they have not yet actively initiated the process toward a smart city. 44 cities are in the pilot project phase, 11 in the institutionalization phase and only 5 in the establishment phase. One municipality provided too little information to assign to a maturity phase. These results are in line with expectations and correspond to other perceptions of Swiss smart cities (see also Smart City Guide). Gegenüber der ersten Umfrage im 2020 ist im Jahr 2022 eine Zunahme der Smart-City-Aktivitäten zu verzeichnen. Compared to the first survey in 2020, there is an increase in smart city activities in 2022. The number of urban municipalities and cities not yet in a maturity phase decreased by 13%, while the number of municipalities in the pilot project phase increased by 10%.

Findings & Outlook

In Switzerland, the organizational development of smart cities within the city administration is still rather low. Currently, the topic is being actively worked on in 28% of the cities and is under development in 36%.

At the time of the survey, only 22% of the cities had a smart city strategy (cf. Figure 6). However, this number will increase in the coming years: 17% of the cities have a strategy under development. In addition, the number of cities and towns that have an office responsible for smart city issues is expected to increase.
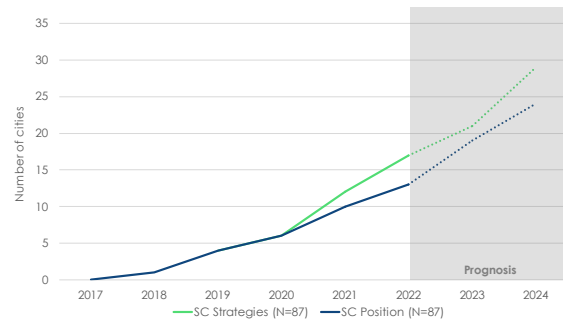

Figure 6: Development of the number of cities/municipalities with a Smart City strategy and/or Smart City position..

Although many cities cannot yet be assigned to any phase, over 50% of cities rate smart city issues as important (4) and very important (5) on the scale shown in Figure 7, and only 2% rate the issue as not important at all (1). It should be noted here, however, that self-selection of participants could play a role, and also only those cities that perceive the topic as important chose to participate in the survey.
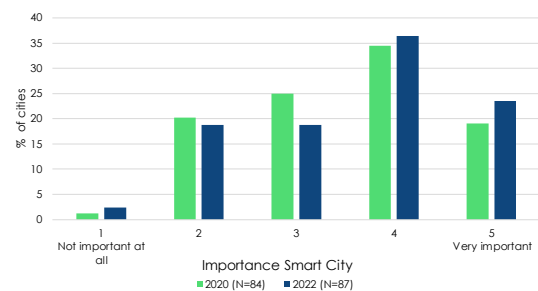

Figure 7: Importance of the topic smart city for the own city/municipality in comparison 2020 with 2022.

In an open question, participants could freely identify what characterizes a smart city for them. The keywords were categorized and presented as a network. The results paint the picture of a smart city as the cities imagine it. The most-coded umbrella terms were «digitalization», «connectivity», «sustainability», «innovation», «resource conservation», «Processes/control» and «quality of life». The specific terms and their visual representations can be found on the website.

SC Wheel Breakdown

Beyond the Smart City Index, participants were also asked directly how important they thought the six dimensions of the Smart City Wheel were in a Smart City. As shown in Figure 8, all dimensions were perceived as important. The Smart Environment, Smart Governance and Smart Mobility dimensions were defined as most important.
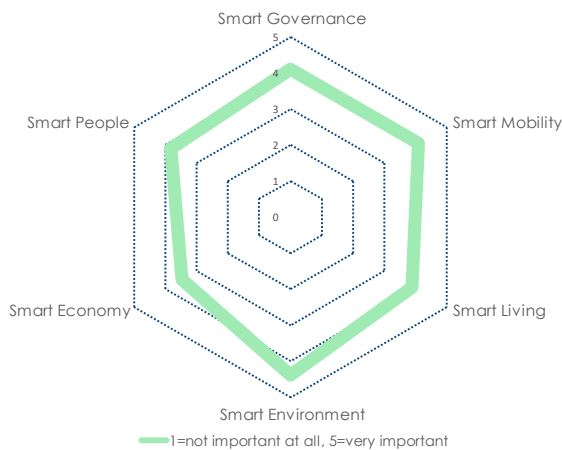

Figure 8: Assessment of the importance of smart city wheel dimensions.

An open-ended question gave cities the opportunity to list 10 projects that highlight their specific smart city efforts and assign them to one of the six dimensions. Although the dimensions were rated as similar in importance, it can be seen in Figure 9 that there are significant differences in the number of projects per dimension.
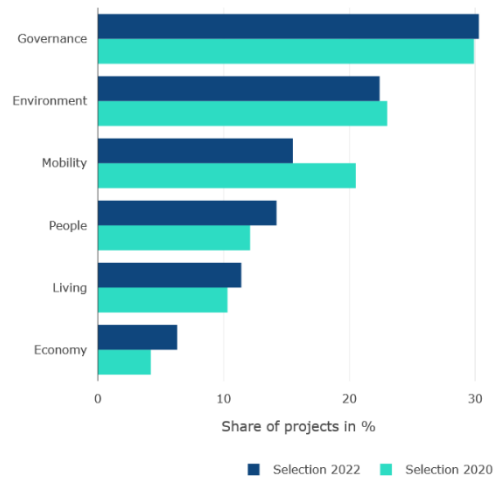

Figure 9: Number of projects (in %) by Smart City dimension (figure source: dashboard.smartcity-survey.ch).

A total of 302 projects were listed and classified according to sub-area. Based on the descriptions of the sub-areas, these were coded and grouped over several turns to provide an overview of the most frequently mentioned project types.

94 projects were grouped into the action dimension Smart Governance when listed. In the case of **Smart Governance**, projects on the topic of "administrative reform through digitization" were mentioned very frequently. Several cities are focusing on digitization for internal processes, for example in the area of traffic technology, signals and markings, or energy data management. In addition, many cities are involved in the provision of digital services. For some, this means revamping their website, or developing a city app that facilitates access to information relevant to the administration. The provision of digital services can be created through various offerings, such as online counters, city notifiers, chatbots, *eBau* for digital building permits, or *eUmzug* to make relocation notifications counter-free. Within the administrations, there are various projects that make meetings paperless and carry out reforms in the direction of digital transformations. On the topic of open governance, there are initiatives that create open data platforms, as well as

various participation opportunities that interface with the area of smart people.

In the area of **Smart Environment**, 50 projects were listed. Compared to 2020, in 2022 the certification for an *EnergieStadt* label was no longer mentioned. Most of the projects that promote renewable energy are in the field of photovoltaics. Projects often mentioned there are the funding of the addition and concepts to promote installations on public buildings. Other projects that aim to conserve resources are in the areas of smart metering, smart lighting, and heating networks. In the field of urban planning, there are various projects in the area of green space planning. There, the planting of trees was mentioned several times as a measure. In addition, there are projects that further develop city centers and prevent flooding, for example. Waste management is also an important topic in many projects and is addressed by electro waste collection vehicles, circular approaches and the intelligent waste management. Sustainable buildings are also an important topic. In the area of nature and the environment, there are also special projects such as optimization of the irrigation of urban green space and automated cleanliness measurement.

With 68 projects, **Smart Mobility** is also one of the areas receiving more attention. Through the open listing it became clear that many cities are working on a new mobility strategy, whereby sustainability is to be promoted by more efficient mobility systems. Many projects talk about intermodal transport. On the one hand, this means expanding existing public transport infrastructures, such as real-time displays or bus line extensions, expanding bicycle lanes and integrating bike-sharing systems. Other projects take a different approach to mobility strategy and focus on the integration of IT and technological innovations, such as autonomous buses and shuttles, intelligent data collection in the transport sector or AI-supported traffic control. A particularly important topic in the mobility sector is smart parking and parking management. These are typically implemented with the help of parking sensors and digital payment options for parking fees.

In the area of **Smart People**, where 45 projects were listed, most of the projects involved various participation options through eParticipation platforms, citizen surveys and workshops. The measures mentioned are intended to create an enabling environment for participation. Other participation initiatives promote local business by providing a marketplace platform. In addition, projects on education were also listed, such as ICT at elementary schools, programs, campaigns and games that promote climate and energy friendly living.

In the case of **Smart Living** (37 projects) the main focus is on improving the quality of life. Various projects promote smart and integrated neighborhood development, digital opportunities for interaction and digital access to art. In the area of care for the elderly, there are projects for an obstacle-free public space and for the networking of older people. The expansion of the fiber-optic network was also frequently mentioned.

In the area of **Smart Economy**, with 20 projects fewer initiatives have been listed compared to other areas. Notable projects are working to establish co-working spaces and innovation labs, such as the "WinLab Reallabor" in Winterthur. Additionally, there are efforts to promote circular economy and sharing economy.

A more detailed overview of the projects mentioned can be found on the website (smartcity-survey.ch/en/insights).

<u>What are cities looking for when developing a smart city?</u>

Smart City projects are predominantly initiated within the city administration/energy utilities or by politics and are oriented primarily to other municipalities and cities, cantonal goals, as well as to certifications/labels, such as the *EnergieStadt* label. 67% of the cities are guided by other municipalities and cities in the definition of development or strategy goals. In the

dashboard of the Swiss Smart City Survey, municipalities and cities can orient themselves using the factsheets of other cities and municipalities. The cities would like further support, especially from the federal government and the cantons.

<u>Future developments</u>

In order to identify changes in the smart city landscape in Switzerland, the survey will be conducted regularly every two years. Anyone interested in becoming a partner for the next survey is welcome to contact the ZHAW. In two years, a general increase in smart city activities and progress in the transformation process is expected. In addition, more cities will be encouraged to participate.