



**Strategic Research and Innovation Partnership
(SRIP)
Smart Cities and Communities**

**Key orientations of
SRIP Smart Cities and Communities
verticals**

Introduction

The European Smart Cities 3.0. initiative (2014) defines a “Smart City” as a city built on a “smart” combination of activities of independent and aware citizens, performing well in 6 characteristics (Smart Governance, Smart Economy, Smart Mobility, Smart Environment, Smart People and Smart Living).

The vision of partnership between the verticals in SRIP Smart Cities and Communities is to establish a globally recognised ecosystem of partners, permanently synergistically enhancing and linking their competence, as well as offering adequate capacities for R&D, production and marketing of globally competitive innovative high-tech solutions in all aspects of Smart cities and communities.

In line with this vision, the following strategic orientations have been defined:

1. Establishing a globally recognised ecosystem of partners, permanently synergistically enhancing and linking their competence in Smart Cities and Communities domains and technologies.
2. Providing for resources and conditions to minimize the time from design to market for globally competitive innovative high-tech solutions.
3. International recognition of “trademark Slovenia” in PmMIS (Smart small cities and communities).

The interconnections of different fields, relations with the ICT horizontal network and connectivity to other strategic development partnerships make the SRIP Smart Cities and Communities verticals a significant factor in placing Slovenia on the map as a green, active, healthy and digital region with top conditions for creating and innovating on a global level. The development will focus on mid- and high-tech niche solutions for comparably small urban environments, which are subject to different regulations and conditions affecting their development.

Objectives

First and foremost, the objectives will be aligned with achieving the targets of SRIP verticals’ focus areas and towards synergies with the other stakeholders to meet the global S4 (Slovenian Smart Specialisation Strategy) objectives.

1.) Objectives subject to the global objectives S4

1. Higher revenue: 3.5% average annual growth of total revenue and 5% annual growth of revenue from export.
2. Growth in company and employee count: 3.5% new companies annually, 1.5–2% new employees annually.
3. Average growth of companies’ investment potential: 0.25% annually until 2019, 0.15% after 2019.
4. Average growth of value added per employee: 3.5% annually.
5. 15% increase in the number of subjects involved with SRIP Smart Cities and Communities until 2022.

2.) Specific objectives

1. Developing globally competitive system solutions for smart cities and communities.
2. Launching at least two pilot projects.
3. Using the public administration reform and deploying smart solutions to promote entrepreneurship and penetrate the global markets.

DESCRIPTION OF FOCUS SRIP SMART CITIES AND COMMUNITIES VERTICALS

1. Health

The **key objective** is improving the health services and the health of population in smart cities and communities, reaching a state of precision healthcare.

Precision healthcare is a step ahead of personalised medicine, as it also defines the activities and criteria of success (time, space, optimality, finance, execution, public health).

The priority development fields are:

1. Smart devices, sensors and tele-healthcare:

- a. Monitoring the functional health parameters and the quality of living in smart living environments, aiming for the earlier and more efficient detection of health complications, lower medical costs, reduced sick leave, and prevention of adverse effects of living/working environments and habits on the standard of living.
- b. Health monitoring with wearable sensors, above all for determining the side effects of vaccination in paediatrics, and in dental care: The incidence of known complications after paediatric vaccination is about 3% in Slovenia (up to 36% for some polyvalent vaccines) and up to 10% in the USA.
- c. Personalised long-term care for the patients, the elderly and other target groups, using the following breakthrough technology: advanced ambient and body sensors, intelligent recognition systems and personalised co-production for health, recreation and lifestyle, tele-medical products and new insurance policy models.

2. Smart treatment:

- a. Proton therapy systems for malignant diseases, improving the reliability of the whole system and enabling advanced solutions for proton therapy centres and additive radiation by precision targeting of tumours.
- b. Exact patient positioning systems: The optimisation and digitalization of therapies in combination with advanced treatment systems magnified the need for robotic therapy beds. Furthermore, precision spatial positioning of patients and controlling the motion of organs being operated upon have gained on significance. Robotic surgery is now in full swing worldwide.
- c. Comprehensive manufacturing of personalised medical implants using 3D-printing and objective assessment of surgeries and rehabilitation in smart environments, the key advantages of which are personalisation and customised optimisation of all phases of surgery, from pre-operative activities, manufacturing the implant, the surgery itself, to post-operative activities and rehabilitation.

3. Digital healthcare

- a. Implementation of paper-free healthcare in the form of connecting platforms for data transfer, processing and visualisation between different electronic medical files, smart queue optimisation, safe data exchange between health-care institutions and patients, and handling digital privacy.

4. Smart integrated healthcare and patient care system

- a. Establishing a smart integrated healthcare and patient care system involves a system-wide implementation of a smart integrated healthcare and patient care system and building an environment for further development and implementation of tele-medicine and patient care, the development of products for tele-medical treatment and healthy lifestyle, as well as training the users for the use of tele-medicine and tele-care services.

2. Energy and other supply

The key objective is improved flexibility of energy production, consumption, storage and transformation, as well as improved management of energy and water distribution networks.

Energy use can be roughly divided into three domains of approximately the same magnitude: transport, heating, and electric power for other purposes. Aiming to mitigate the effects of global warming and reduce the carbon footprint, and considering the strategic tendencies to reduce the dependency from

imported energy, our attention should focus on improved energy efficiency and renewable energy sources, also going hand in hand with the (micro) local approach (production for own consumption).

The priority development fields are:

1. Energy transformation, distribution and management:

- a. Using flexible production, consumption, storage and transformation of energy (DR/DSM/EMS): The focus is on providing the necessary building blocks for the development, demonstration in real-life scenarios, and a later market launch of new and improved innovative products for consumption, measurement, communication between devices, analytics, optimisation and forecasting, management etc.
- b. Distribution network observability, controllability and automation (DMS): Joint development will focus on technologies, approaches and their interconnections for comprehensive and innovative new and improved products and services for active distribution networks and their structures, the optimisation and exploitation thereof, loss reduction and control.
- c. Holistic energy management (EMS), including data management and integrated system services (integration): Focus is on the use of technologies for linking data from different product directions, communications, forecasts etc.
- d. Products and services at the junction of energy industry and e-mobility: Technologies for a common energy management system; development and integration of GIS platforms; technologies for charging electric vehicles based on the available infrastructure (minimum investment), energy availability and operating characteristics of distribution networks; technologies for energy storage and integration of renewable energy sources; technologies for public transport (e.g. electric minibus).
- e. Products and services for the supply of gas, heat and other services: billing and dynamic pricing technologies, smart metering/data capture, transfer and analysis, preparation and distribution including the consumption management in supply systems, competence for dynamic pricing based on energy balancing between supply and demand in local energy communities etc.

2. Comprehensive support for water services:

- a. Comprehensive provision of water services, including all the necessary support with the following focus fields: preparation and distribution of drinkable water, managing risks in drinking water supply, monitoring and optimisation of drinkable water supply systems, targeted management of water body quality standards, services and technologies for optimised water use and advanced water services, services and technologies for monitoring and managing extreme water events (floods, drought, extraordinary contamination and similar), water services for the end users. Considering the importance of water as a priority asset, water services are subject to important optimisations and seeking new technological solutions, and above all they bear the need of linking a wide circle of experts and organisations, which is also the basic postulate of SPS.

3. Mobility, transport and logistics

The key objective is improving the mobility of people and goods through reliable, adaptable, fully accessible, safer, more fluent and greener urban and suburban mobility, transport and logistics services.

The priority development fields are:

1. Infrastructure, smart algorithms, integration with ICT:

Development of a comprehensive service-oriented architecture, using several interrelated information or data points originating from cities to achieve efficient data blending and consequentially the development of integrated solutions, enabling the integration of diverse databases and IT platforms. Blending heterogeneous data (history, sensor, real-time, systems for detection, identification and authentication) into data capable of supporting even the most advanced logistic services. Enabling billing, analyses of traffic density and traffic and travelling habits, merging with data from public transport providers (e.g. schedules).

2. Building blocks of digitalized mobility in a smart community:

The objective of this package is to establish a basic back-office application, standards and legal framework for the integration of individual smart city subsystems, and establishing a uniform information platform for smart city logistics as a service.

3. Business models, platforms, sharing economy, shared rides:

Digitalization and technological enablers are opening new opportunities for previously infeasible business models, usually based on **platform business models and value network ecosystems**. We will focus on identifying the key interactions between the stakeholders, sources of supply and demand, and relevant (big) data and technologies (“sources”). Management will be conducted through an offer of suitable supporting tools and services, and through regulation of ecosystem rules. The key value added will be a supply and demand matching service (“management”). The business models are digital and data-driven, implying a systematic development of metrics and analytic methodologies to form a feedback loop and boost the network effects (“measurement and strategy”).

4. Security

The key objective is reinforcing the feeling of security in smart cities and communities through coordinated preventive and operational activity in the field of public and private safety. The vision of development is efficient management of any endangering situations in collaboration with the other Smart Cities and Communities verticals, aiming to provide better conditions for work, living and investments.

The priority development fields are:

1. Next generation operations centre systems, providing security to cities and local communities:

enabling efficient operational management to the operators and the feeling of security to residents based on orchestrating (open) data from various sources and devices, aided by a comprehensive and versatile access to gathered information and knowledge and a user-friendly presentation thereof; the Operations centre will link data sources with services for an efficient collaboration and coordination in the event of incidents and emergencies, as well as a proactive approach to the prevention and mitigation thereof. The foundations of the Operations centre will be high-performing advanced technologies such as big data, the Internet of Things (IoT), convergent high-bandwidth communicational services for the critical infrastructure, data blending and artificial intelligence, integrated and open systems etc.

2. Next-generation emergency call centres:

including the infrastructure for network and data connectivity, enabling both the traditional emergency voice calls and the data, text and video communications. The system will use advanced caller location mechanisms in 4G/5G networks. Dynamic emergency call forwarding systems will ensure the calls are forwarded to the most appropriate Public Service Answering Point with respect to the situation, location, required service, including the special needs user groups, and a combination of several criteria customised according to the needs by the system operator. The callers will be able to relay key information for the emergency services to determine the as-is situation at the location of the event for a more effective action.

3. Smart city security surveillance systems:

Surveillance platforms using static and mobile sensors/actuators for real-time surveillance, providing better security to the people and surveillance of the surroundings by collecting information in public spaces, important buildings, traffic and from individuals, including the real-time sensor data originating from the environment and the smart phones. Surveillance systems will be efficiently used in different ways for the protection of vulnerable groups (children, elderly, disabled ...), surveillance and protection at mass events, as well as information analysis and sharing

with the public and the residents. The systems will be able to integrate public and private CCTV sources, providing real-time video-surveillance. Querying video records in the archive will enable intelligent video-analytics and forensics. Surveillance systems can be integrated with the Operations centre and with automation systems.

4. **Operationally-tactical security centre at the tactical-operational level for organisations with special powers** (police, security services, army), accepting all the relevant information (regardless of the technology) that is critical for public safety. The centre will use state-of-the-art technologies such as biometrics, face recognition, analytics, AI, big data processing, machine learning, and others. The systems enable integration of multi-sensory and multi-modal intelligent video-surveillance systems with automated detection of anomalies, deviant behaviour, as well as integration with situational awareness technologies, wearable & smart security devices, man-down systems, and others.

5. Quality of urban living

The key objective is raising the quality of living in urban environments for different target groups, in order to provide for a sustainable and green economic and social development.

Integration is inherent to this field, as the quality of urban living is influenced by all the previously mentioned fields, as well as products of other strategic development-innovation partnerships.

The priority development field is:

1. **Analytical platform for the planning, monitoring and management of environments**, including the following packages:
 - a. Monitoring, planning and management of urban environment, including the monitoring systems, systems for planning of existing and required capacities of economic and social infrastructure to determine the current level and reach a higher level of quality of urban living, development of criteria and measures for measuring/defining/improving the quality of urban living and personalisation thereof, land policy and land development for different activities, data and information capturing systems (sensors, measuring devices), information-supported systems and space usage concepts, linking with the other fields (health, mobility), integration platforms as a window of access to appropriate data, products and services, planning, digital privacy management services and tools, developing green infrastructure and tracing the effects thereof, environmental monitoring systems etc.
 - b. Inclusion of participatory methods, systems and platforms into monitoring of the quality of urban living: participatory reporting for the development of urban centres, for participatory methods of observation and planning of public services according to the “Citizen’s Observatory” concept, participatory city planning.
 - c. Information-supported systems and services for different target groups: the older population, vulnerable groups, self-sufficiency and nutrition
 - d. Business development with the following focus fields: Cradle to cradle design – transition from linear to circular economy, services for managing and terminating digital transactions compliant to eIDAS, robotization in the architecture and treatment of green surfaces, shaping user experiences in Future lab, implementation of green infrastructure, multi-language platforms.

6. Smart city ecosystem

The key objective is linking data, services and products created in different areas of the smart city, in this way utilizing the potential of digitalization in the context of smart cities to the full.

The priority development field is:

1. **Open integration platform for linking and developing more comprehensive solutions and common services**, consisting of the following packages:

- a. Platform core: the platform core consists of the components shaping the basic services for the integration platforms. The key components are the *application catalogue* (available via the digital library), *the catalogue of APIs* (available on the developer portal), the *identity management* component, the component for *access management and control*, the component for *monitoring and controlling* the use of individual platform elements, the component for *platform use analytics*, the security platform, the *usage billing* platform ... The platform core will be based on modular architectures (components, microservices), enabling the integration of various solution and adaptation to different fields, processes, chains, countries ...
- b. Digital marketplace: The digital marketplace is an open digital space, designed to publish applications for different fields of the smart city (such as transport, logistics, health and active living, energy ...). Common to all applications is their ability to benefit towards better services for citizens and the economy, thereby contributing to the quality of living and the growth of local and national wealth. The digital marketplace is destined for the end users and will provide an advanced search facility, as well as other well-established concepts of modern digital marketplaces.
- c. Developer portal: the developer portal is a modern development tool, making it possible for the individuals and organisations to quickly develop new applications using the data and services available via the integration platform. The key element of the developer portal is a set of application interfaces (API), to be published by different providers and platforms according to precisely defined rules.
- d. Portal for platform providers: all the smart city verticals such as traffic, health, energy etc. are complex in themselves and offer their own platforms. For example, there is a healthcare platform available in scope of the National Institute of Public Health. Similarly, there are plans for a National traffic management platform which will provide big traffic data. In addition to the two segments mentioned above, there are several others where data is collected in a central location, and their nature makes them useful for developing new applications and services in the context of smart cities. The portal for platform providers is a special component of the integration platform, making it possible for the platform operators to offer their data via the integration platform in a controlled and transparent way.
- e. Portal for municipal authorities: municipal authorities are a special stakeholder in smart cities. They usually require a separate overview of smart city activities, commonly through relations with projects taking place in the city, an insight in the budget and budget expenditures, by tracking the public opinion and reactions, as well as through several other indicators designed to measure the smart city efficiency in several areas. The portal for municipal authorities is a customized solution, providing insight into the smart city to the municipal authorities.
- f. Advanced visualization and analytics: a large quantity of data is collected in a smart city, providing several opportunities for analyses, knowledge mining, predictions etc. The component for advanced visualization and analytics provides a common environment for data analysis and visualization. In time, we are going to specialize it for the specific needs of different smart city fields.