

# ELECTRONIC SERVICES OR SMART CITIES – CURRENT EXPERIENCES AND PERSPECTIVES IN THE SLOVAK REPUBLIC

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## **Abstract**

*Smart City solutions are these days applied not only in big, but also in small and medium sized cities in a wide variety of countries worldwide. Also municipalities in the Slovak Republic are using to a different extent smart city solutions to improve the life of their people. The goal of this paper, based on the premises, that also small and medium sized cities can become Smart City, is to present and analyse good examples of Smart City solutions in the Slovak Republic. The focus will be on the city Kežmarok, which can be considered as a medium sized city and which by implementing existing Smart City solutions from third parties, but mainly by developing innovative solutions directly in the city, can be seen as good example and good practise in the respective field.*

**Keywords:** *Smart City, Slovak Republic, Kežmarok, Development.*

## **1. Introduction**

The importance of cities as of the socio-economic centres is increasing globally, mainly due to increasing urbanisation, which the cities confront with the need to become more and more smart and to be able to face the challenges of urban life complexity [28, 10]. Smart city concept reflects the vision of a city aiming to improve economy, mobility, environment, people, living standards and governance [19]. Many definitions take into account a widely accepted approach of understanding smart city which interconnects multiple areas, components and which is multifaceted and wide ranging [10, 2, 25, 15]. These areas and components have to communicate with each other, the system should not be static and immobile and should include all stakeholders into planning and decision making [24].

However, smart city does not represent a concept which could be applicable and usable only within large cities. On contrary, also small and medium sized cities can become smart city, and their size doesn't need to be a limit in this regard [3, 20]. Also the document „Smart cities. Ranking of European medium-sized cities“, which the theory refers to as to the one of the first documents focusing on smart city, is a document elaborated for the European Union in 2007, which deals with medium sized cities. In this document, smart city is characterized by smart activities in Economy, People, Governance, Mobility, Environment, Living [13]. At present, the definitions and explanations of smart city are much more sophisticated, there are studies, scientific articles and

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many literature on this subject. We have dealt with this topic in other articles: see for example [29, 28, 30]. Despite the knowledge of smart city theory, it makes sense to remind, that smart city can be defined by using 6 components [13], or group of five individual environments [34], or group of three pillars [2], or through actors involved [24].

It is anticipated, that the world population living in cities will increase in the coming years, with the European Parliament's estimates [11] pointing out, that by 2030 will six out of ten people live in a city and by 2050 will this number increase to seven out of ten people living in a city. As we have stated in the previous texts and we stick to the opinion [28], smart city approach is not only a summary of proposals for modern city development and city management, but in our opinion it is also a concept which can be used for flexible problem solving and setup of processes in city management, planning and policies. At the same time we believe, and we are again referring to the ideas from 2015 [28], that smart city is a normative, that expresses a certain idea, how a modern and efficient city should look like and cities are trying to get closer to this prototype with their everyday improvements.

According to the European Parliament [11], modern cities functioning based on the smart city principles can become a key strategy to face poverty, inequality, unemployment and energetic management. Continuing urbanisation is accompanied with a phenomenon, that the population is more concentrating into cities, but smaller cities are those where the majority of people are still living in. The transformation of small cities to smart cities is from our point of view associated with the question, when exactly such a city becomes smart city, what are the preconditions of this transformation and what are the accompanying phenomenon. It is possible to see nowadays, that some cities in the effort to become smart city are implementing electronic services, which they then claim as smart. In this regard it is important to name and distinguish between the application of the smart city concept and when the city is "only" using electronic tools characterized for the particular level of eGovernment. The aim of this paper, based on the premises that also small and medium sized cities can become smart city, is to present and analyse good examples of smart city solutions in the Slovak Republic.

According to the Statistical Office of the Slovak Republic [32, 33] in 2017 approximately 2,9 million people in the Slovak Republic were living in cities and 2,5 million people in the Slovak Republic were living in rural areas. Altogether in 2017 there were 2890 municipalities in the Slovak Republic, with the size distribution of these municipalities being particularly significant. Altogether 1999 or fewer inhabitants lived in 2459 municipalities (of which 137 municipalities had 99 or less inhabitants) and 2000 or more inhabitants lived in 431 municipalities. A similar situation can be found for example in Italy, where 47,5 % of the Italian population lives in cities with less than 20 thousand inhabitants and 31,3 % of the Italian population lives in cities with less than 10 thousand inhabitants [5].

The focus of this paper will be on the city Kežmarok, which can be seen as a medium sized city and which by implementing existing smart city solutions, but mainly developing innovative smart city solutions directly in the city, can be considered as a good example. The limitation of the basic assumption, that a small or medium sized city can become a smart city is, that a specification of precise city size categories would require a more extensive research in concrete municipality's conditions of a particular country. We do not assume, that every municipality can become a smart city, but it is not excluded that also small and medium sized municipalities can become one.

## 2. Smart City in the Slovak Republic

Smart city has become a topic discussed professionally, scientifically and also generally by the public in the Slovak Republic conditions, while more and more attention is being paid to this topic also from state sector, self-governments, private sector and non-governmental organisations. Systematization and coordination of the activities leading to smart city solutions is within the state sector concentrated to the Ministry of Economy of the Slovak Republic and to the Office of the Deputy Prime Minister of the Slovak Republic for Investments and Informatization. The Ministry of Economy of the Slovak Republic clearly pointed out, that smart cities should be considered not only due to the implementation of modern technological innovations, but also with the connection to social aspects. Smart city thus represents areas which are of a common interest of several ministries and other central state government organisations, as well as other public administration subjects on the central and decentralized level of public administration [23]. From the point of the private sector, represented by concrete private companies, it can be seen as the offering of “readymade” smart city solutions, which are offered to the municipalities for example in the form of a paid service or as a package of multiple services / solutions. Incentives for smart city solutions are also generated by the municipalities themselves, where they are developing as “in house” solutions with the potential to overlap beyond the city to other subject in the direct managing competence of the city, but also wider to other cities inspired by to approaches which can be applied also in their specific conditions. Smart city incentives and solutions can come also from the third, non-profit sector.

The Office of the Deputy Prime Minister of the Slovak Republic for Investments and Informatization started new web pages focused on the smart city topic. The aim of introducing this online platform was to offer a portal, which would on one place offer all information about smart cities, which are mostly in the Slovak Republic conditions very fragmented. The goal is, that municipalities, private companies but also the general public could find information clarifying current smart city activities in the Slovak Republic, that municipalities and other eligible entities could have access to all calls for smart city financing projects at one place, that municipalities would have the opportunity to discover good examples of smart city solutions in the Slovak Republic and from abroad [26, 31]. It should be emphasized at this point, that the Office of the Deputy Prime Minister of the Slovak Republic for Investments and Informatization is also responsible for informatization and eGovernment strategies in the Slovak Republic. Some of the elected representatives at the municipality level thus identify smart city activities with overall informatization, respectively they do not perceive the difference when they are applying eGovernment procedures and when they are starting to move towards a smart city.

In 2018, the Ministry of Economy of the Slovak Republic supported smart city projects with a half of a million Euro in ten different Slovakian cities [22]. However, the role of the Ministry of Economy of the Slovak Republic is also conceptual and strategic, which was manifested in 2017 by publishing the strategic document Support of innovative solutions in Slovak cities, which aimed to become the fundamental strategic document supporting smart city solutions in Slovak Republic conditions. Besides the basics, principles, components, recommendations and suggestions regarding smart city solutions, the results of a survey relevant for smart city solutions in concrete Slovak Republic’s conditions have been also presented within this document. The survey was realized on a sample of 69 representatives of Slovak cities and 100 Slovak companies which are providing different smart city solutions. As a result of the survey within the cities, vast majority (83,3% of respondents) of the representatives involved in this survey do know the term smart city, while 68% consider smart city as beneficial for their city. On contrary, despite the positive perception of smart

city, up to 38,8% of the cities have not invested in any smart city solutions. From the perspective of future development, city representatives in the survey declared, that they are interested in investing in smart city (95,7% of respondents) and that they would welcome the opportunity to get to know positive examples of smart cities from abroad (91,3% of respondents). As a result of the survey carried out within companies, up to 60% of entrepreneurs would welcome the removal of legislative obstacles and 70% of entrepreneurs perceived the financial support from the state as significant / critically important. Legislative conditions for e-mobility, taxes and contributions and energetics have been pointed out as problem areas of significant importance, while qualified workforce was perceived as the least problematic topic for the companies [23]. This means, that Slovakian cities do know what smart city means, they are interested in investing into smart city and they want to know more about examples of smart city functioning from abroad, but many of them have not yet invested in smart city. Subsequently, companies operating in the segment of smart city do not have problems with the lack of skilled workers, but rather lack the appropriate business conditions, especially in the area of financial support from the state and overall business environment.

Companies are considered a driving force for innovations in the area of smart city solutions and within the application of these solutions in conditions of a concrete city. On the one hand they are using data coming from municipalities and subsequently on the other hand they are offering specific solutions to municipalities [23]. One of the companies that offers “readymade” solutions for municipalities in the Slovak Republic conditions is Datalan, which offers ready to use applications and ready to use solutions based on Cloud computing through the platform [digitalnemesto.sk](http://digitalnemesto.sk), while the main hardware and also security protection tools are covered by the company, not by the municipality itself [6, 8]. the portal offers today online services with a particular focus on mandatory information publishing, electronical auctions, digital municipal council, online forms, interactive municipal budget, mobile application. Altogether 113 municipalities in the Slovak Republic were registered at the platform [digitalnemesto.sk](http://digitalnemesto.sk) by the time surveying it, with 111 of them using some of the services offered. In most cases, the registered municipalities were using just one service, mostly the service on mandatory information publishing (only 10 municipalities were using more than one service, while none of the municipalities were using all of the services offered) [7, 9]. Another example of smart city technology solutions offered by companies is the initiative “I want smart city” focused on the area of navigation, management, parking, waste management and city lights, which was created in the consortium of six Slovakian technological companies: Sygic, Sensoneo, Seak, GoSpaceTech, ALAM a MycroftMind [4]. The corporate view on smart city solutions always comes across a one-way view of the company profit orientation, while smart city has to be a concept that complexly addresses the problematic of strategic city management in a way, so that the resources are used effectively and so that the quality of life of residence and all of the other actors in a city would increase. In this regard, the ideas which are companies offering may not have the necessary extent of complexity, are not always strategically oriented and they are just partial problem solutions.

Besides the smart city initiatives from the state level, or the proposals for solutions generated from the private company sector, some municipalities are trying to develop and implement “in house” solutions, where the idea, implementation and realisation of a smart city measure is formed as a unique thing in conditions of a concrete self-government unit. City Kežmarok is in Slovak Republic’s conditions a good example of an innovator city in this regard.

### 3. Smart City Good Practices of Kežmarok City in the Slovak Republic

Kežmarok city is situated in the High Tatras region, in the North East of the Slovak Republic. It's average height is 626 metres above the sea level and altogether 15 832 people were living in the city in 2018 [18]. Targeted activities of the city Kežmarok aimed at implementation of smart city solutions have been reflected in systematic and strategic measures as well as in real steps. City Kežmarok, like all municipalities in the Slovak Republic, has developed its Program for Economic and Social Development of the City Kežmarok 2014-2020, which is a medium-term strategic development document of a city and which contains all relevant development goals and priorities of a city [1, 27]. In addition to this strategic development document has the city Kežmarok decided to address smart city topic also in a form of a special strategy Idea Concept Smart Green City Kežmarok, which is mainly focused on smart city solutions in governance, energetics, environment and shared economy, in specific city conditions [14].

City Kežmarok is using some smart city solutions, which are available on the market, but also designs own solutions within its interorganizational capacities and implements these “in house” solutions in practice. One of such an innovative solutions is the application MSP SOS, which was developed as a unique project in the city Kežmarok in close cooperation with a partner mobile application developer company from the private sector.

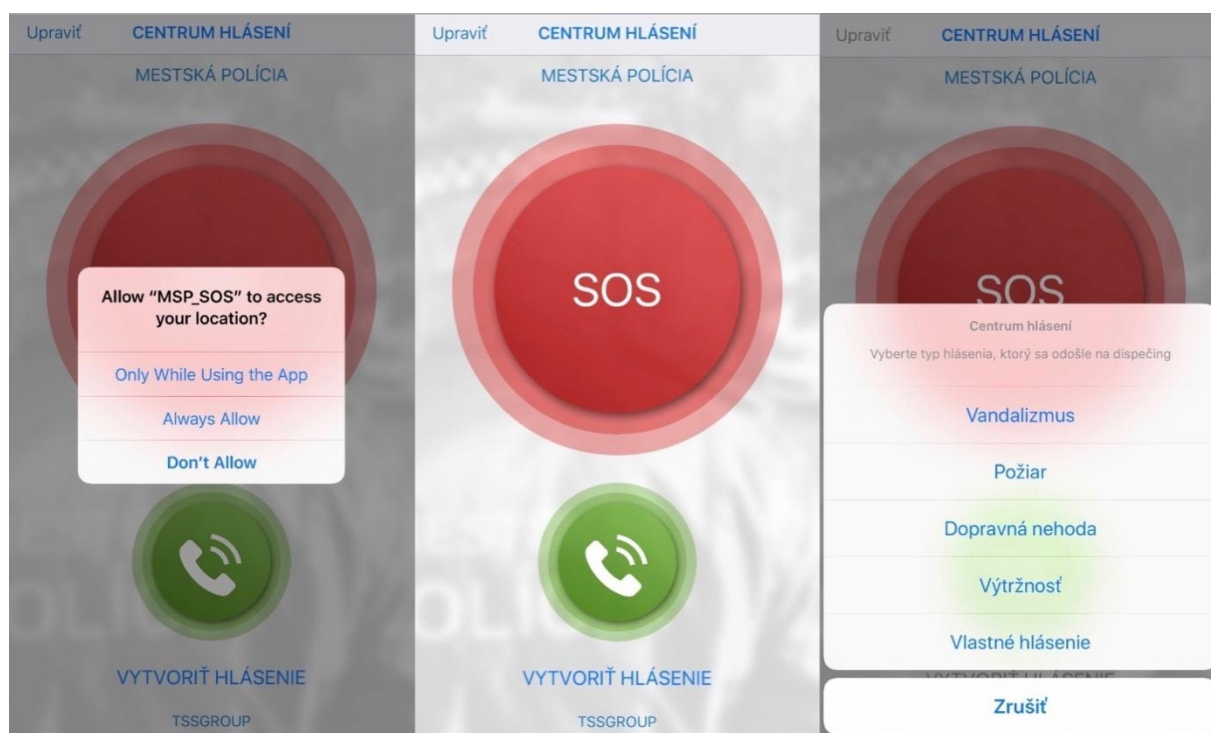


Figure 1. MSP SOS App (Source: [21])

The aim of the MSP SOS application is to increase the safety and comfort of living for the city inhabitants. The app is available for Android and Apple users, requires mobile internet connection or Wi-Fi connection, the user has to allow the app to access his location and a prerequisite is also user registration by entering first name, surname and phone number. The registration is used to

minimalize potential misuse of the app and the user can be blocked by the provider. Application has currently three functionalities:

1. SOS – after pushing it, the local city police will receive a message in a form of audible signal and the city police will also receive all information about the registered user. By using the location of the mobile device, city cameras can focus on the area, where is the user who have send the signal. After that, the operator of the city police will assess the situation and will decide about the next steps.
2. Feeling distressed – the user makes use of this functionality to indicate that he might be at risk, while a real treat hasn't happed yet. After using this functionality the city cameras, by using the location of the user, will automatically focus on the user and will track his movement for one minute.
3. Create a report – this functionality gives the user the possibility to report any of the anticipated situations, which are vandalism, fire, traffic accident, rioting, or to draw attention of the city police onto something else by using custom report [17, 12].

Another example of a smart city solution, which the city Kežmarok has initiated is a 2D and 3D geographic system mapping all the city's infrastructure. Data collection and development has been going on for four years and should be completed in the autumn of 2019. The aim is to completely map the infrastructure of the city, including all the buildings, roads, sidewalks, underground networks, fiber optic cables, greenery, parks and so on. The system also includes a precise mapping of the overall infrastructure by using GPS coordinates. City Kežmarok is expecting that the processes in the city can be faster and that the management can be improved. For example, with regards to the greenery, the aim of the city is to know where are all the trees, bushes and other greenery, including the information about their age and health condition. This could improve how the city will be able to plan greenery renewal or it will help the city to better communicate some activities for the people. Another positive example of this solution is, that if an accident happens, the repair and intervention wouldn't need to wait for the information where is the infrastructure underground. By using 2D and 3D map with GPS coordinates, all necessary work can be directed in a way that any other damages are prevented. The availability of the information from the 2D and 3D map will depend on the profession of each user. For example, an architect will have wider user privileges, through which he doesn't need to request information from the city office, what will optimize administrative activities at the city office and also of the user [16, 12].

By using these examples, our aim was to highlight possibilities also of the small or medium sized cities, which can develop and implement smart city solutions and thus become smart city. However, these solutions wouldn't be meaningful, if the people in the city wouldn't accept them and use them. Civic participation and cooperation is a fundamental precondition for every smart city. This also proves, that the interconnection of smart city's components is the foundation of a smart city and that without cooperation and interdependence this concept couldn't be implemented.

#### **4. Conclusion**

There is often a very thin dividing line between the application of specific smart city solutions and the implementation of selected electronic services as part of eGovernment. We assume, that if cities are implementing new, modern and innovative approaches leading to effectiveness and as a part of strategic management of the city, we can talk about smart city solutions. Investments into smart

city, which would only be a part of city's branding and not as a meaningful activity reflecting city strategy, can turn out to be a waste of resources [2]. Cities have to be careful not to become the victims of a profitable third-party motive in order to become a part of a smart city trend, but they have to have the improvement of the city's life always in mind in the first place.

Not everything that seems to be modern has to be smart. Likewise, not every solution using ICT and electronic approaches, has to be an expression of a smart city. Also, smart city doesn't need to be associated only with large cities, because also small or medium sized cities can effectively implement this concept, if it means using innovative solutions for increasing the quality of life in a city. Smart city solutions used in practice are a combination of state government's efforts and of the desire of a concrete city. The involvement of state government was shown at the Slovak Republic example, where the Ministry of Economy of the Slovak Republic and the Office of the Deputy Prime Minister of the Slovak Republic for Investments and Informatization are carrying out specific activities dedicated to support smart city projects, to create and run smart city portal summarizing all important information in one place. Some cities like to be marked as smart, because of marketing needs, but in reality they use only some of the smart city solutions and not the overall complex strategy as an approach for the entire city. We think, that regardless of the motivation leading to implementation of smart city solutions, always when it comes to improving the quality of people's life, it is beneficial.

City Kežmarok, representing a medium sized city is a good example, how limited resources of a city can be effectively used by implementing specific smart city innovative solutions to improve the life in the city. However, in the case of Kežmarok, this required not only taking on the national trends, or investing into readymade solutions offered by the private sector. City Kežmarok managed to build smart environment, which is based on a specific strategy created for the city and for the smart city solutions, which helped the people living in the city to feel more secure, which created conditions for the city and for the public to effectively use gathered geographic city data. Good example of the city Kežmarok is mainly based on innovative solutions generated within the city, which Kežmarok managed to move far beyond the use of electronic means that would only be an expression of eGovernment.

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