Alba Iulia – Landmark for Smart Cities in Romania

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Abstract:

Worldwide, we have remarked a dynamic development of Smart City projects. However, several cities are facing important challenges on their way of digital transformation.

Thus, the rapid urbanization of cities imposes a series of social, economic, architectural and environmental challenges to the central and local authorities. Alongside with the development of cities and enlargement of their public services, we witness the complex governance process.

In this context, several cities in Romania, such as Cluj Napoca, Brasov, Alba Iulia, Bucharest have already started to develop a series of Smart City projects.

The measurement standard for a city for being smart is provided by the effectiveness for managing its resources and its inhabitants' life quality.

The current paper aims to present the state-of-the-art of smart cities in Romania, highlighting the main accomplishments and innovations of Alba Iulia Smart City. It also emphasises as successful factor for the development of smart cities, the role and place of information and communication technology, incorporating Internet of Things, cloud computing and big data, thus making the services of a municipality more interactive and efficient.

Keywords: *digitalization, ICT, urbanization.*

1. Introduction

It is acknowledged that in 2016, 54.5% of the world population was living in cities (UN, 2017) and therefore the city authorities are confronted with a broad range of social, economic, architectural and environmental challenges.

Caragliu et al. (2011) state: "We believe a city to be smart when investments in human and social capital and traditional (transport) and modern (ICT)

communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance".

According to Landry (2006), cities should be "green and safe but also culturally vibrant".

Barber (2013) has sustained that "city government is crucial to solving global problems and mayors rule the world". Landry (2006) has also argued that "local politicians and city managers should not strive to be the best city in the world but for the world".

"The idea that cities are the nucleus of economic development is widespread and, for governing the city, this means that city politicians and administrators should not aim to solve all the problems in the city but rather they should strengthen the capacity of urban systems to tackle a wide variety of problems and produce a wide range of public values" (Landry, 2006).

Smart governance refers to creating smart administration.

Gil-Garcia (2012) highlights that "a smart state is a new form of e-governance using sophisticated information technologies to interconnect and integrate information, processes, institutions and physical infrastructure to better serve citizens and communities".

Lee et al. (2013) assert that "governments should design technology roadmaps for supporting research and development of future technologies and public sector services that could improve the quality of life for citizens to enhance government legitimacy".

The European cities provide up to 85% of their region's GDP (UN, 2014), revealing a broad range of interactions among citizens and offering digital opportunities for education, innovation, creativity and value added products and services aimed at enhancing productivity, efficiency and prosperity.

Worldwide, the cities are facing the era of digital and societal transformation, comprising social, economic, urban, mobility, educational, technological and cultural changes.

In this context, it is important to improve the ecosystem of the stakeholders and citizens. The current economic progresses are requiring demands for smarter and better products, services and definitely new skilled jobs. Therefore, the European cities should adapt to these fast changes, taking into account the focus on improving the countries' competitiveness.

Taking advantage of online public datasets, the cities should focus on developing innovation and enhancing the economic growth. Open data strategies should reconfigure the traditional citizen-local government relationship. Therefore, the open data platforms represent an important successful factor for smart cities.

Other important asset is education. As asserted by Vrabie, "nowadays, the globalization and economic competition should make governments to prioritize education – in all of its aspects: quality, equal opportunities for everybody and lifelong learning".

2. State-of-the-art of smart cities in Romania

In Romania, the concept of 'smart city' is still new. Although Bucharest has been pioneer since 2007, implementing a traffic management system, a few smart city projects have been achieved. But nowadays, this concept has been inserted on the agenda of Bucharest Municipality and at the same time the cities from Western Romania have advanced quickly.

Bucharest Municipality and 23 counties in Romania have at least one smart city project that was finalized or is ongoing, according to the Romanian Association for Smart Cities and Mobility.

We shall highlight the main achievements of the cities of Romania in this area.
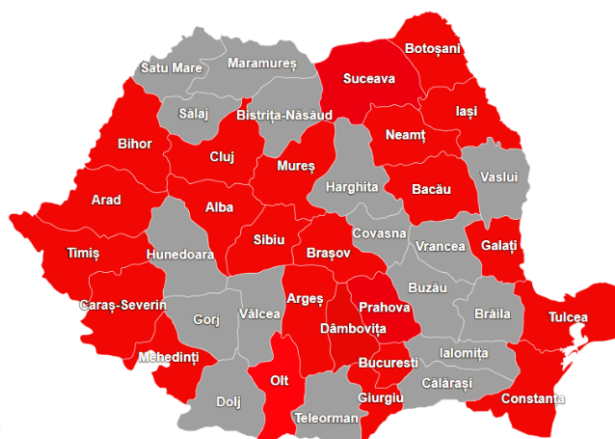
Figure 1. Map of smart city projects in Romania (2017).
Source: Romanian Association for Smart City and Mobility,
http://romaniansmartcity.ro/

Table 1. Number of smart city projects in Romania (2017)

City	Number of projects	City	Number of projects
Alba Iulia	100	Tulcea	1
Cluj-Napoca	9	Danceu (Mehedinti county)	1
Sibiu	8	Mioveni (Arges county)	1
Bucharest	6	Giurgiu	1
Piatra Neamț	6	Ploieşti	1
Oradea	5	Botoşani	1
Galaţi	5	Gura Humorului (Suceava county)	1
Timişoara	4	Târgu Mureş	1
Braşov	4	Târnăveni	1
Constanţa	3	Târgovişte	1
Iaşi	3	Bacău	1
Reşiţa	2	Balş (Olt county)	1
Arad	1		

Source: authors, based on data of the Romanian Association for Smart City and Mobility,
http://romaniansmartcity.ro/

Alba Iulia

In 2017, the smart city initiatives in Alba Iulia have exploded further the launch of the pilot project "Alba Iulia – Smart City 2018" by the Ministry of Communication and Information Society.

Recently, Siemens published the study "The business case for smart cities", which has included Alba Iulia, next to Aberdeen and London, Brussels and Kartal neighbourhood of Istanbul. This study shows that Alba Iulia should invest 227 million euro in the area of connectivity, energy and mobility in view to become a smart city. The proposed solutions refer to an integrated touristic platform, free extended Wi-Fi, service for renting electric bicycles, smart street lighting.

In view to transform Alba Iulia in the digital capital of Romania, there **are already implemented 100 pilot smart city projects in various areas such as: smart lighting,** *smart metering, smart communication, e-governance, smart mobility, digital education.*

The main challenge for Alba Iulia *is to integrate the projects, to ensure security, interoperability, adequate communication and especially highly smart trained human resources.*

Braşov

Braşov city hall has developed several projects aimed at modernisation of its public services, in view to enhance the comfort level for the citizens and tourists.

Braşov city hall has developed smart models for managing the city in view to ensure modern management of the public utility services in the following areas: administration, local public transport, energy, e-governance (portal of e-services and mobile applications, integrated technical division), IT management of local public transport (e-ticketing, fleet management), smart public lighting, ICT solutions for public security, territory management systems and e-geo-spatial solutions.

The current smart city projects refer to smart parking, smart lighting, loading station for the electric cars, smart pedestrian crossing.

Bucharest

Bucharest Municipality has a strategy comprising the main pillars of the architecture for smart city. The main accomplishments refer to Traffic Management System, bike-sharing system, smart public transport, Emergency Situation Management system.

During 2007–2009, the city hall implemented a smart Traffic Management System, being at that moment the most modern one in Europe. On 18 July 2017, the new Traffic Management Center was inaugurated, holding a single integrated command for the public transport management system, a control system of urban traffic and a video surveillance system. It is in fact a first step toward transformation of Bucharest in a smart city.

Recently, the tender for procurement of 400 buses, 100 trams and 100 trolleybuses, the tender procedure for installing free Wi-Fi for passengers and the tender for 100 electric buses with Wi-Fi were launched.

Currently there is a smart parking in sector 4, with 13 parking locations for 3000 places, each endowed with loading stations for electric cars.

Nationwide, the Civic alert, a private initiative, launched in 2015 is operational, where the citizens can complain to the local authorities about various problems in the city. The problems refer to pits in streets, traffic jam, strays, bad traffic lights, flooded streets, deforestation, garbage thrown in the street, illegal construction and, more recently, cases about breaking the smokeless law.

Concluding, the smart city projects refer to smart energy, bike sharing, electric buses, self-service terminals, ICT services, loading stations for the electric cars.

Cluj-Napoca

Cluj-Napoca is very developed as smart city, and at the beginning of 2017, the city hall created the Consultative Council for IT Entrepreneurship and Innovation, aimed at closer and efficient collaboration between IT community and local government.

Since April 2017, the city hall provides the possibility to issue the following documents in electronic format through the *edirect.e-guvernare.ro* platform: urbanism certificates, agreements, notifications, building authorisations.

The city hall of Cluj-Napoca Municipality provides to the citizens the possibility to pay online the urbanism charges on its website: www.primaria clujnapoca.ro, section online payments, as well as all their taxes and charges. Additionally, the city hall provides the free mobile application My Cluj, that could be accessed on mycluj.e-primariaclujnapoca.ro or www.primariaclujnapoca.ro. My Cluj is integrated with INFOCET – the internal document management system, meaning that the complaints are directed to the specialized Office of the city hall.

Other projects refer to smart parking in the center of the city, smart public transport.

In 2015, a student from Cluj-Napoca created an application for public transport adapted after the model in Vienna.

Constanţa

Constanţa does not hold an integrated strategy for smart city, however such type of projects have already been implemented. For example, in June 2017, the first smart parking was inaugurated, based on a technical solution achieved by Telekom Romania and ZTE. The city will implement a smart city strategy on medium and long term based on four development vectors: safe city, mobility city, energy city and e-city.

Iaşi

The ongoing projects refer to smart mobility, loading stations for the electric cars, adaptive traffic management system.

Oradea

In July 2016, Oradea Municipality launched the IT Strategy for Oradea 2016 - 2020, comprising also an integrated strategy for city digitalization.

At that time, this was the first structured approach for developing a smart city in Romania.

In 2015, the city hall in partnership with the Association for Tourism Promotion in Oradea and its region launched the application Oradea City App, providing information about touristic attractions, location of hospitals, pharmacies, public transport, parking.

In 2016, the city hall launched the application Oradea City Report, enabling to the citizens with civic spirit to transmit various complaints and incidents to the city hall and providers of local public services (water, transport, heating, police, etc.). The city digitalization includes also smart parking.

In 2018, the project for smart lighting of the boulevards and the project to install video cameras at the entries of the city should be implemented.

Piatra Neamț

Six smart city projects are developed: smart banks, smart security with video surveillance, smart public services, ICT services, touristic guide, smart education.

Sibiu

In 2011, Sibiu city hall created and implemented an e-administration platform, for better and efficient communication with community. The platform is used for paying online taxes and charges, submitting petitions, requiring information, over 15000 citizens being registered.

Since April 2017, Sibiu city hall issues also in electronic format the urbanism certificates, the authorizations for buildings through https://edirect.e-guvernare.ro platform. The required documents are also electronically submitted by citizens.

Since July 2017, Sibiu city hall, through the Local Fiscal Division issues in electronic format the fiscal certificates for houses and lands.

In the area of smart public lighting there are developed two projects for installing eco-efficient lighting in two parks, Wi-Fi hotspots and web cameras.

Other projects refer to smart public transport, smart parking.

Timișoara

The city hall has already implemented a series of smart city projects such as: traffic management system, smart parking, Wi-Fi in all three main markets in the historical city.

3. Alba Iulia Smart City

According to the Integrated Strategy of Urban Development for Alba Iulia 2014–2023, the city is open to smart solutions and technologies of future.

On the occasion of celebrating the Centenary of Romania in 2018, Alba Iulia aims to insert the city on the map of digitalized touristic cities worldwide. Alba Iulia represents the first smart city project developed jointly by the national government, a local public authority, public institutions and private companies.

Alba Iulia Smart City will use smart technology and data in addressing present and future city challenges related to sustainability, social and economic development, energy and environmental issues.

In this context it will be the first city in the country to host a live exhibition of smart solutions.

The Alba Iulia Smart City 2018 pilot project was awarded a prize at the Competition European Public Sector Award 2017 in Maastricht next to cities as Vienna, Toulouse, Dortmund, Barcelona or London.

This pilot project is focused on implementing smart, innovative and compatible solutions at local level, in a wide range of areas.

In 2017, Siemens published a study forecasting that "the development of Alba Iulia under smart city principles could yield total estimated benefits of 532 million euro over the course of 35 years".

Siemens report presents "several delivery models and financing mechanisms that could be deployed in Alba Iulia, such as mobility-as-a-service, where customers pay subscriptions to have access to vehicles including taxi services or bike sharing schemes.

The municipality could raise funds by issuing bonds or tapping crowd funding channels. A more conventional way to raise financing could be public-private partnerships. In this way, private players and public authorities could share the risk and financing for the roll-out of smart initiatives".

"With a population of around 63, 500, Alba Iulia welcomes 400, 000 visitors per year, out of whom 14% come from abroad. This is one of the reasons why the municipality has inked pilot projects that aim to support digital interfaces that help tourists get around the city and find out more about the main attractions".

Alba Iulia represents the pioneer in Romania that has tried to integrate the ICT technologies and obtain real-time feedback from its citizens regarding its future development.

Alba Iulia is developing smart city projects based on collaboration with Orange Romania, Microsoft, Siemens, Philips, Telekom Romania, Cloud Soft, Solar Eco, Fast Order, Schreder, Flash Lighting, ZTE, Parking Plus, Association IT Center for Community Solutions, White City Code SRL, Association Cluj IT, Euro Job Company etc.
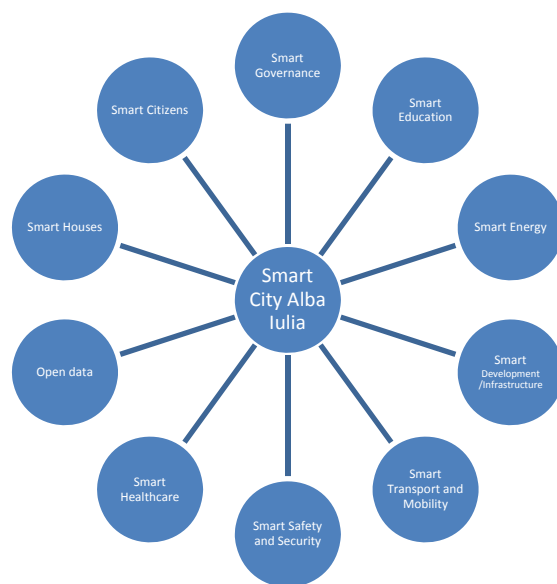
Figure 2. Dimensions of Alba Iulia Smart City.
Source: the authors

In the framework of Smart City 2018, Alba Iulia will benefit of 21 smart solutions provided by Cluj IT Cluster. It will be the first "Brained City" in Romania, the whole architecture being thought on the same functional structure with the human brain, with data centers, centers for processing and interfaces for connectivity, according to the size and specificity of community.

The smart solutions include the following:

- *City Health* – platform for smart monitoring of the city health, providing real-time access for citizens to notifications and data concerning the activity of local authorities and reported problem solving.
- *Parking Plus* and *City Parking,* enabling to find a parking place.
- *Donnate450.ro* – online platform, available at national level, aimed to facilitate the blood donation through communication between transfusion centers and potential donors.
- *Peditel.ro* – assistance service available 24 hours, dedicated to parents who need professional medical advice for their children health.
- *Okey.ro* – online platform for SME smart management, supporting the development of the community entrepreneurial ecosystem.
- *City Connector* – providing the modality to connect/interface of the information systems and data centers of local authorities, thus ensuring the integration of smart city applications.
- *City Pass* – providing facilities and integrated services.
- *iCloudSolution* – digital services for e-community: Web and Mobile platform at Cloud level, for providing cloud services, in view to enable the meeting of demand and offer in a virtual e-business environment.

- *„ Agro Fair" Platform* –web platform for the stock of agricultural products.
- *Platform for Efficient Energetic Monitoring, Control and Management.*
- *Virtual Reality/virtual cultural assistant* – for promoting the *cultural*-historical values of the city.

The above solutions aim to create a smart ecosystem of connected, configurable systems, addressed to each area of living and activity in the context of the urban ecosystem.

Alba Iulia Municipality has a strong collaboration with Orange Romania, aimed to develop a smart city project comprising 14 components.

Orange concept for smart city includes:
- Wi-Fi Hotspots with secured access to Internet in high schools and universities (1 Decembrie 1918 University, Horea, Closca and Crisan School Group and Dionisie Pop Marţian Economic College).
- Wi-Fi Hotspots with secured access to Internet in public area.
- Solution for smart public transport.
- Solution for optimization of pedestrian traffic and public transport fleet.
- LoRa WAN infrastructure for loT applications and devices.
- Solution for measuring the air quality.
- Solution for touristic promotion and interaction with citizens (implementation of a mobile marketing platform aimed at promoting the strategic attractions and interaction with citizens).
- Solution of tele-management for public lighting using LoRaWAN IoT network, in view to optimize the energy consumption and costs for operation and maintenance of the system.
- Solution of tele-management and smart metering of the public system for water distribution, using LoRaWAN IoT network.
- Securing access to Internet for all smart city components.
- Speeding up the start-ups in the framework of Innovation Labs 2017 programme.
- Civic Alert – introducing Civic Alert platform (www.civicalert.ro).
- Solution for digital classrooms: applications for integration of Google Apps for Education (Gmail, Drive, Hangouts, Calendar, Sites).

4. Conclusions

For the time being in Romania, we remark the development of urban ecosystems such as smart cities, based on a vision involving the advanced IT technologies, aimed to make the living, the activities and processes specific for actual urban communities more harmonized, eco-efficient and citizen-centered.

Alba Iulia represents the first city in Romania in adopting and using revolutionary instruments and methods in view to enhance the life quality of its citizens.

The solutions of connectivity, the innovative approach, the collaboration with universities, businesses, NGOs, and high tech companies constitute relevant strengths of Alba Iulia smart city.

Alba Iulia made important accomplishments aimed at enhancing the quality of public services, increasing the efficiency of resource management, using of instruments and facilities to attract new investors, increasing the visibility of the city and the number of tourists, as well as increasing the satisfaction degree of final users for the smart solutions.

Thus, Alba Iulia Smart City 2018 represents an important step for Romania digitalization.

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