

WOLAŃSKI



EVALUATION OF THE IMPLEMENTATION OF THE SMART CITY CONCEPT IN VISEGRAD GROUP COUNTRIES

PRESENTATION OF FINAL REPORT

JUNE 2021



European Union
Cohesion Fund



AGENDA

1. SCOPE OF THE STUDY

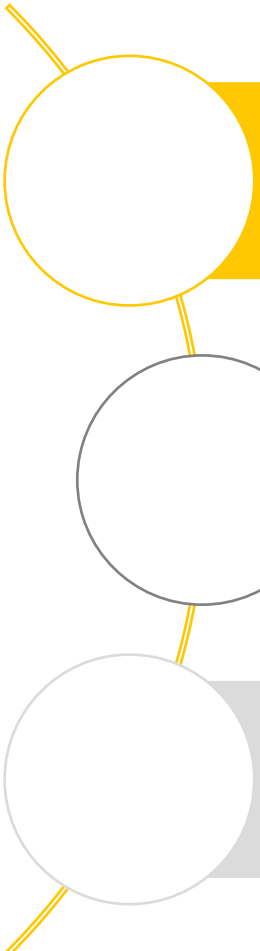
2. SMART CITY PROJECTS IN V4 COUNTRIES

3. CONCLUSIONS AND RECOMMENDATIONS



1. SCOPE OF THE STUDY

WHAT IS SMART CITY?



Urban environment in which a digital approach to sustainable development has been introduced to reduce resource consumption, improve quality of life and enhance economic competitiveness

The concept of Smart City should be understood not only as a set of technological solutions, but as a response to the negative impact and challenges of the urbanization process, as well as support in response to unforeseen events, e.g. a pandemic

Being a Smart City requires not only direct implementation of digital (ICT) solutions, but also changes in the way the city is managed

3 MAIN RESEARCH QUESTIONS

Q1

- How the concept of Smart Cities has been implemented in key strategic, programming documents in V4 countries?

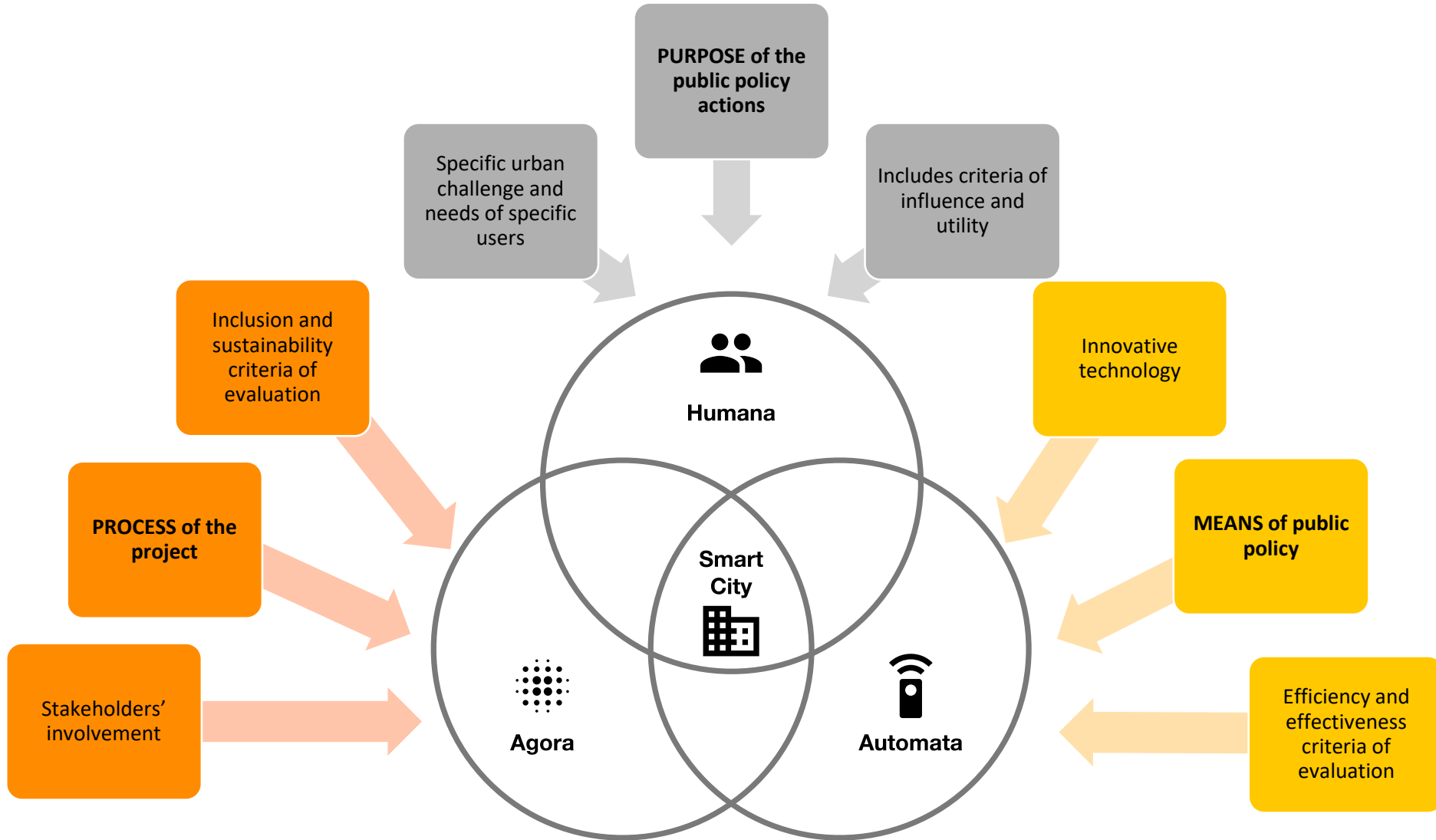
Q2

- What are the good practices of Smart City projects in V4 countries?

Q3

- What factors and mechanisms increase the success of Smart City projects?

ANALYTICAL FRAMEWORK



METHODOLOGY

Q1: Implementation of the Smart City concept in V4 documents

Document review at national and local level

Interviews with representatives of ministries in the V4 countries

Comparative synthesis



Q2 & Q3: Smart City good practices and success mechanisms

165 good practice proposals from national experts

Selection of 56 projects covering the matrix

Interviews, documentation analysis and nethnographic research

Qualitative comparative analysis (QCA)

BASIC CASE STUDY OF 56 SMART CITY PROJECTS

Interview with
the owner

Interview with
the contractor

Desk research

10 IN-DEPTH CASE STUDIES WITH USER EXPERIENCE RESEARCH

CAWI survey

IDI interviews (phone
and on-line)

E-mail consultations

Review of publications,
articles and research
results after system
implementation

Comments on social
media platforms

Assessment of
solutions made by
Google users

QUALITATIVE COMPARATIVE ANALYSIS (QCA)

Contextual factors

Project supported by the city during implementation

Legal regulations hindering implementation

Technological factors

A tailor-made solution

User-friendly solution

Open solution

Data availability

Process factors (commitment)

EU funds

Private capital

State aid from funds other than the EU

Local community or users

Other relevant stakeholders

Properly explaining the solution to key stakeholders

Stakeholders co-design the solution

Stakeholders test the solution

The result - a solution functionally plugged into the urban Smart City ecosystem



2. SMART CITY PROJECTS IN V4 COUNTRIES

RESEARCH AREAS

City management

Business and
entrepreneurship

Environmental
protection

Healthcare

Transport

Energy

Science and
education

Tourism

Culture and
activation of
inhabitants

Waste, water and
sewage
management

POOL OF SMART CITY PROJECTS



1. CITY MANAGEMENT	2. BUSINESS & ENTREPRENEURSHIP	3. ENVIRONMENTAL PROTECTION	4. HEALTHCARE	5. TRANSPORT
E-documentation, e-government C05 Golemio Prague	<u>Circular economy</u> <u>P04/P46 Individual Waste Segregation System Ciechanów</u> <u>EXTENDED STUDY</u>	Air quality monitoring technologies P57 Let's end with smog in Poznań	<u>Remote emergency response systems</u> <u>C25 Zachranka</u> <u>EXTENDED STUDY</u>	Intelligent transport infrastructure (car parks, PT stops) C15 Parking and traffic system Kvasiny plant
E-notifications and alerts P60 Smart City Poznan APP	Sharing economy P47 Mobility budget – Voom	CO ₂ emission control technologies P08 Vehicles for environmental protection Warsaw	<u>Remote diagnostics and patient monitoring</u> <u>P70 Polish anti COVID-19 app</u> <u>EXTENDED STUDY</u>	Traffic tracking and management systems H10 BKK Futar Budapest
<u>Direct communication systems of inhabitants with local authorities</u> <u>P59 Urban Lab Gdynia</u> <u>EXTENDED STUDY</u>	Data security systems P49 ChainDoc Toruń	Water quality monitoring technology P65 Microtox water biomonitoring Poznań	Health system e-documentation H08/H27 National eHealth infrastructure	Diagnosis systems of technical condition for roads and bridges S19 Meteostation in Prešov
Mobile applications activating residents P01 iVoting Jaworze	<u>Geofencing for business</u> P66 Placeme.pl	Sensors detecting leaks of harmful substances S09 Control of emission in US Steel Košice	Communication systems with doctors and consultants P67 Znanylekarz.pl (Known Doctor)	Toll collection and parking systems P62 E-control SPPN Warsaw
Systems for cybersecurity C26 E-services from Azure for Czech citizens'	Intelligent buildings S07 Lidl logistics center Sereď	Environmental control systems H06 Tree register Budapest	Technologies for home medical care S14 Smart solution for seniors living alone	<u>Autonomous vehicles for public transport</u> <u>H41 Automatic metro line M4 Budapest</u> <u>EXTENDED STUDY</u>
Building security systems P71 BVMS for Polin Museum	E-Services for business C13 Data driven factory management Mlada Boleslav Skoda	Green buildings P09 Konrad Bloch Office building	Health care analysis systems P38 Visual Crowd Detector	
<u>Incident Response Systems</u> <u>C01 Drones for IRS Pilsen</u> <u>EXTENDED STUDY</u>	Chatbots and AI assistants P69 Chatbot Mat InPost	Recycling technologies S08 Žiar waste recovery center	Drones for the transport of blood and medical devices during accidents P39 aiRPAS Rescue	

6. ENERGETICS	7. SCIENCE & EDUCATION	8. TOURISM	9. CULTURE & ACTIVISION OF INHABITANTS	10. WASTE, WATER & SEWAGE MANAGEMENT
Smart Grid P50 Smart Heat Distribution Network Warsaw	E-learning H13 Mozaweb – digital school applications	Intelligent ticketing systems P23 Gdansk Resident Card	Technologies for the reconstruction of monuments in virtual reality S31 Spis Castle in VR	Technology for water storage P30 Intelligent retention system Bumerang Rzeszów
Energy storage H11 Geothermal smart district heating Miskolc	E-school management and e-registers C09 Smart keychain Kolin	<u>Bots-guides</u> H15 Pocket Guide <u>EXTENDED STUDY</u>	Augmented reality technologies (AR) in cultural facilities H38 Interactive elements in Castle of Gyula	Sewage treatment technologies C14 Sewareg recycle Prague
<u>Charging stations for electric vehicles</u> P18 E-public transport in Zielona Góra <u>EXTENDED STUDY</u>	Gamification technologies in education P21 Trashbusters	Interactive tourist routes P41 Your Warsaw 1918/2018	Intelligent infrastructure for disabled people P34 Totu Point Poznań	Flood control systems H40 Solar pump Kartya street Budapest
Intelligent urban lighting H12 Eclipse smart lighting system Szank	Interactive classroom equipment H14 Ujbuda education program Budapest	Luminous and multimedia visualisations S28 White nights Košice and Bratislava	<u>3D visualisation technologies in museums</u> S30 House of Marina <u>EXTENDED STUDY</u>	Water distribution systems C07 Smart water meters Brno
Photovoltaic systems P51 PV on 35 high-rise buildings Wrocław	<u>Virtual student databases and educational progress analysis systems</u> P68 Librus <u>EXTENDED STUDY</u>			Waste collection and sorting technologies S35 Who recycling more paying less

CATALOGUE OF SMART CITY GOOD PRACTICES

1.4. iVoting Jaworze

Jaworze, Poland	
City Management	
Mobile applications activating residents	
Owner: Carbonet Sp. z o. o.	
Budget: 7 700 EUR	
Year of implementation: 2020	
SHORT DESCRIPTION	

The iVoting system's main purpose is to help in carrying out consultations with citizens in such a way that their results are reliable - so that only authorized persons take part in them. On the other hand, it is to ensure full anonymity to voters. The system provides two basic tools for conducting voting on the Internet - poll and consultation. The iVoting Blockchain System, which can operate in conjunction with the local application smart interface, is a decentralized trust network enabling safe, anonymous, fair voting over the Internet using advanced cryptology and a public register. The result of the project implementation is a product innovative on an international scale, which enables a secure, strong, unambiguous, electronic confirmation of the voter's identity (creating a digital identity of a CyberID resident) using blockchain technology. Thanks to the system, it is possible to carry out all kinds of voting (except for general elections, i.e. nationwide) and electronic signing of all kinds of documents by "voting" (with private keys) using smartphones and computers. Final users are the residents of a given city.

IMPLEMENTATION PROCESS

The application was designed by Carbonet Sp. z o.o. More than a dozen scientists were involved in the work on the project, including those from the Częstochowa University of Technology, Wrocław University of Technology, as well as employees of several Warsaw universities. Most of them deal with the subject of cryptography and blockchain architecture in their scientific work.

1.4. iVoting Jaworze

The decisive role was played by the Jaworze County Office, which was amongst the first in which the system was implemented (as of today, the system also functions in the Górzno county). In Jaworze, the system has been refined and adapted to the legal framework in which local governments in Poland operate.

PROJECT EFFECTS

iVoting services introduces a new function - the possibility of safe and anonymous voting on matters important to the inhabitants of cities and villages. Of course, there are various types of online survey forms, but the protocol used in this solution based on blockchain technology ensures new quality and credibility of the results obtained in the survey/consultation. One of the examples of the application of the project in Jaworze was a vote to transform the Średnia street into a one-way street. The need of this type was reported by the residents, while the county council was against this type of idea.

SUCCESS FACTORS

- Personal involvement in the project of the commune's head and his desire to implement a modern tool in the county, which in the long run has a chance to become a norm when it comes to contact between the office and the residents.
- Cooperation with a technology partner. The Carbonet company approached the implementation meticulously.
- The grant from the National Center for Research and Development.

POTENTIAL OBJECTIVE AND AREA OF ACTION UNDER COHESION POLICY

Objective: **A Europe with a greater social dimension**

Area: **Social inclusion and integration**

Location: **small, medium and large cities or city with functional area**

CITY MANAGEMENT



Working groups for solving urban challenges are gaining in importance, involving people from various areas of life and residents



The systems provide residents with on-line access to services and the opportunity to participate in social life, e.g. voting on issues important to residents



Security issues (property and public) are secured by specialized building systems or the use of new equipment

BUSINESS AND ENTREPRENEURSHIP



Circular economy and goods sharing projects have a great potential for real change (e.g. Ciechanów - the system of individual selection increased the segregation percentage from 10 to 90%)



Enterprises implement Smart City projects without being aware of their greater impact on city areas, although they contribute to an impact e.g. in the field of urban logistics and mobility

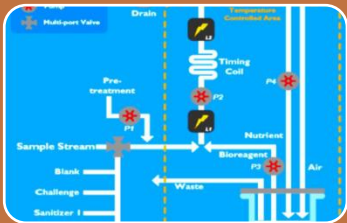


The solutions also consist in improving the flow and production processes in factories or logistics centers

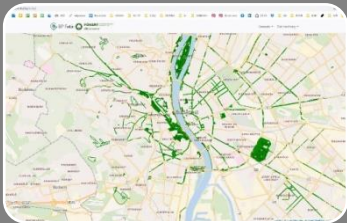
ENVIRONMENTAL PROTECTION



Cities control the emission and concentration levels of pollutants with the support of various types of devices, e.g. drones (Poznań) or specialized vehicles (Warsaw)



More advanced systems are installed to ensure a higher level of water or air quality control, e.g. using luminescent bacteria



The management of green areas in urban areas becomes more important, and residents can use the generally accessible green databases in cities

HEALTHCARE



Mobile applications support city inhabitants: they accelerate the call for help, make it possible to book a doctor's appointment or monitor potential contacts with Covid-19 infected

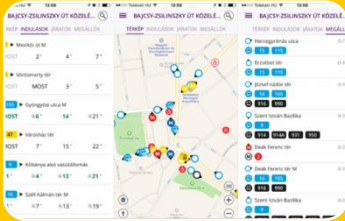


Advanced public health platforms are launched which, thanks to their interoperability, cooperate with other solutions on a national scale



More and more seniors live alone at home. Remote monitoring of their health is ensured by sensors installed in their homes

TRANSPORT



Mobile applications support city inhabitants both before and during travel by public transport, providing real-time vehicle location data



New tools allow for better management of public space, e.g. more effective enforcement of city parking policy



Automatization enters public transport. Automatic vehicles make it possible to increase the frequency and capacity of the transport corridors as well as eliminate the unreliable human factor

ENERGETICS



Projects in this area focus on the construction of a smart grid and the use of renewable energy sources (solar, wind or geothermal energy)



The scope of the project mainly covers the purchase of infrastructure and / or its dissemination (chargers for electric vehicles, RES power plants, smart meters)



Users are rarely involved into the projects (the exception to this is the solution of PV panels on 35 apartment blocks in Wrocław)

SCIENCE AND EDUCATION



In this area, selected case studies focus mainly on primary and secondary school education



Solutions include digitization of schools and tools to make teaching more attractive (e.g. Mozaweb digital school app)



The greatest emphasis is placed on the application of solutions during distance learning in the conditions of the SARS-CoV-2 pandemic (e-learning, e-control of presence and progress)

TOURISM



Solutions in this area relate to both making the content (digital and material) more attractive for recipients and the organizational processes themselves



Simple technological solutions are used (e.g. mobile applications, RFID cards)



The condition for the success of the project is proper communication and promotion of the project objectives (e.g. Your Warsaw 1918-2018)

CULTURE AND ACTIVATION OF INHABITANTS



Solutions in this area have a dual nature, as they include both tourist facilities and facilities that typically activate residents



Both simple (e.g. Bluetooth Low Energy) and advanced technologies (AR, VR) are used



The Totupoint solution is an example of activation of people with disabilities and model cooperation

WASTE, WATER AND SEWAGE MANAGEMENT



This area is intertwined with environmental protection (common goals and tools)



Projects arise mainly due to an incentive in the form of EU funds or due to EU guidelines that need to be adapted to



Solutions also used in smaller cities (e.g. Who is recycling more is paying less)

SMART CITY PROJECTS AND COVID-19

Pandemic resilient projects

- Projects limiting the number of interpersonal interactions
- Projects using non-contact technologies

Projects supporting the fight against the pandemic

- Telemedicine
- Public safety
- Areas where access to public services has been limited (e.g. education, administration)



3. CONCLUSIONS AND RECOMMENDATIONS

RESEARCH CONCLUSIONS

Peculiarity of Smart City projects

Sound but not cutting-edge innovative technology

Strategic level invisible to owners and contractors

Lack of holistic support of Smart City initiatives

Types of projects: scouts vs main force

Some configurations lead to ecosystem

Technology like lego bricks

Lack of uniform definition

Legal regulations are barriers

Smart City immune to the effects and supporting the fight against the pandemic

STRATEGIC RECOMMENDATIONS

Providing comprehensive support

More flexible financing

Equalization of funds distribution

Legal regulations flexibility is necessary

Further benchmarking with world leaders

Proposition of support tools

RECOMMENDATIONS FOR CITIES AND PROJECTS

More sustainable projects through better interoperability

Dividing projects into smaller blocks/modules/phases

Implementation by experiments, constant improvement and close cooperation with providers

Improving usability and user-friendliness of technological solutions

Involvement of different stakeholder groups

Improving the competence of offices to implement technology projects