

SID 2025

Sibiu Innovation Days

06-07 November, Sibiu - RO



SMART AND SUSTAINABLE CITIES: DIGITAL TOOLS AND BEHAVIORAL POLICIES FOR SIBIU'S GREEN TRANSITION

Marian Popa

*Public Service: Waste Management, Environmental Protection and Public Domain Administration
Sibiu City Hall*

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CHALLENGES AND OPPORTUNITIES

□ Global Challenges, Local Solutions:

- **Social:** Public resistance to change and the need to ensure social equity in the implementation of new policies.
- **Economic:** High costs associated with smart infrastructure implementation and related financial risks.
 - Note: It is estimated that, without a transition to the circular economy, global waste management costs could increase from \$252 billion in 2020 to over \$417 billion in 2050.
- **Tehnological:** Integrating heterogeneous systems and ensuring data security in a complex digital landscape.
 - Note: Romania is still below the European average for digital governance.

□ Opportunities for Sibiu:

- **Efficiency:** Optimizing public services (e.g., waste collection) through technology leads to massive reductions in operational costs and ecological impact.
- **Sustainability:** Alignment with the principles of the circular economy, which aim to eliminate waste and keep resources in use.
- **Innovation:** Positioning Sibiu as an urban laboratory for smart governance solutions, testing concepts such as Digital Twins and Generative Artificial Intelligence (GenAI).



Our Vision: Data-Driven Governance

From Reactive Administration to Proactive Governance

- **Vision:** Creation of an integrated digital ecosystem where administrative decisions are no longer based on intuition, but on simulations and real-time data analysis.
- **Strategic Project:** Brief introduction of the **SmartGovAI project**, which aims to create a "Digital Twin" of the city, powered by real data from critical domains such as urban planning, sanitation, and public domain.
- **Ultimate Goal:** An administration that can simulate the impact of public policies (e.g., a new tax scheme, a traffic modification) before implementing them, using Artificial Intelligence to generate scenarios and explain them in natural language.

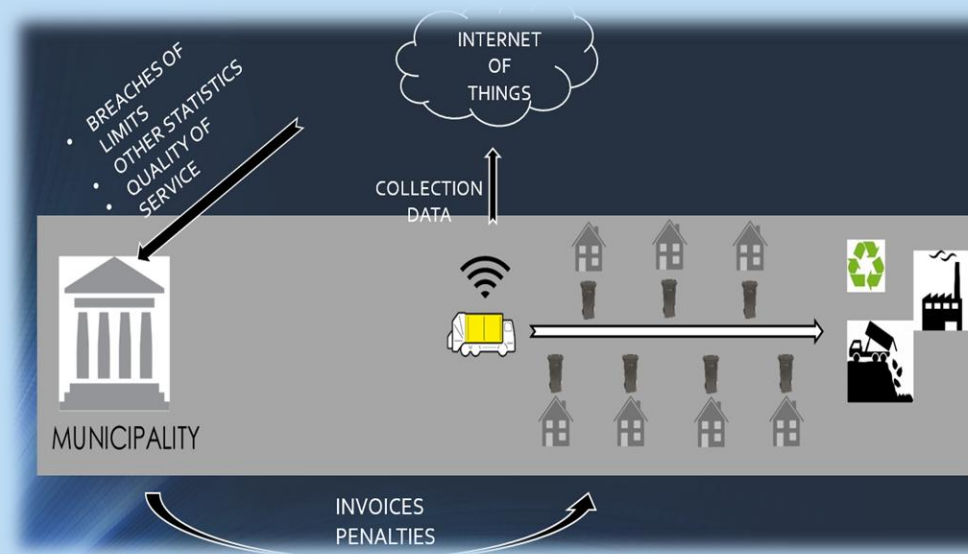


Expertise in Action: Pillars of the Green and Digital Transition

"Our vision is not just a plan for the future. It is built on concrete projects, already implemented or under development. I present three pillars of our strategy."

Pillar 1 - Behavioral Policy: "Pay-As-You-Throw" (PAYT)

- **What it is:** An economic tool that taxes citizens based on the quantity of residual waste they generate, directly stimulating reduction and selective collection.
- **Why it is effective:** Studies show that PAYT can reduce the quantity of waste generated and increase the recycling rate. ***Sibiu Municipality is among the first cities in Romania to implement such a tool, based on a combined model (frequency-volume).***
- **Challenges identified in research:** Implementation can face public resistance, the risk of illegal dumping, and requires adequate infrastructure and a clear legislative framework.
- **Conclusion:** *Addressing these challenges is the key to success.*



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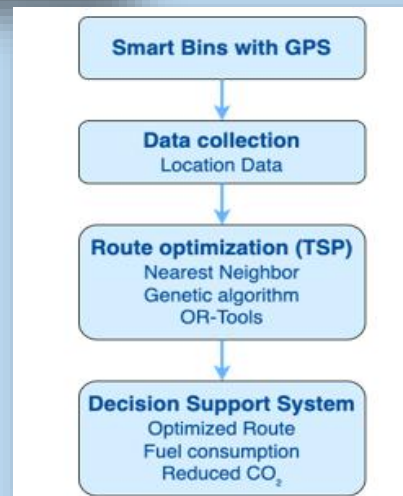
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Pillar 2 - Digital Tools: Waste Collection Optimization through IoT

Real Case Study - Sibiu: Presentation of the digital waste management system



- **Technology:** We use smart containers with RFID tags and controlled access, and sanitation vehicles are equipped with readers and GPS. ***The system records the exact location with every emptying.***
- **Route Optimization:** The collected data is used to optimize routes using advanced algorithms (such as Genetic Algorithms).
- **Spectacular Results:** Experiments on 3 real routes in Sibiu (covering 735 locations) demonstrated ***reductions in distance traveled of up to 52%, which meant a saving of over 69 kg of CO₂ per route.***




Pillar 3 - Energy Transition: The Photovoltaic Park

Phase I - Valorizing a degraded area

- The photovoltaic park will be located on the site of the former municipal landfill "*Rampa Remetea*", which is officially closed.
- Thus, a piece of land that previously only generated maintenance and environmental monitoring costs becomes a source of green energy and economic benefits.

“Project Benefits”

 **Reusing unproductive land** – *locating the photovoltaic park on a degraded site transforms an inactive area into a source of renewable energy and economic value for the community.*



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Pillar 3 - Energy Transition: The Photovoltaic Park (cont.)



- **Objective:** Reducing the administration's dependence on conventional energy sources and stabilizing long-term costs.
- **Project:** Construction of a photovoltaic park to power institutional consumption (schools, hospitals, administrative buildings).
- **Impact:**
 - **Economic:** Reduction of energy bills and redirection of saved funds to other development projects.
 - **Ecological:** Decreasing the public administration's carbon footprint.
 - **Example Role:** The City Hall becomes a model of best practices for citizens and the local business environment.



Pillar 3 - Energy Transition: The Photovoltaic Park

Phase II – Integration of the green energy storage system

- *Following the investment in renewable energy production, Sibiu Municipality plans an additional phase aiming to install an energy storage system for the energy produced.*
- *This phase will ensure the efficient use of solar energy, reduce losses, and increase the level of local energy autonomy.*
- *The storage system will allow for intelligent energy management, adapted to the real needs of the municipality.*





Future Directions:

The SmartGovAI Project and the Governance of the Future

- **Context:** Romania has a low level of digitalization and innovation in public administration (below the EU average).
- The project proposes the integration of **Digital Twin (DT)** and **Generative AI (GenAI)** technologies to modernize local administration.
- The pilot will be implemented in Sibiu Municipality, with potential for European expansion.
- **General Scope:** Creating an **integrated DT + GenAI** system for simulating public decisions, optimizing municipal services, and involving citizens in the decision-making process.



Specific Objectives of the SmartGovAI Project

- Mapping administrative processes that can be automated through GenAI – for a more efficient and faster administration.
- Creating an operational Digital Twin based on real data from the domains of:
 - Urban planning and territorial planning,
 - Sanitation and waste management.
- Implementing an Explainable GenAI interface (XAI) – so that decisions and scenarios generated by AI are transparent and easily understood by mayors, officials, and citizens.
- Developing an interactive dashboard – that allows for analyzing decisions and co-creating public policy scenarios.
- Validating the solution in Sibiu – by testing functionalities, collecting feedback, and measuring impact.



Expected Results & Impact

Innovations Introduced:

- Simulation of public policy scenarios before implementation
- Translating complex results into natural language for better understanding
- Integrating blockchain for traceability and trust

Estimated Impact:

- Increased efficiency of public services and reduced operational costs
- Active involvement of citizens in decision-making
- Increased transparency and trust in the administration
- Creation of a replicable model for other European cities



Strategic Synthesis

1. **Sibiu as a Pioneer:** We have moved past the discussion phase and are already implementing concrete solutions with measurable impact (e.g., route optimization).
2. **Integrated Approach:** Our strategy combines behavioral policies (PAYT), digital tools (IoT), and a long-term vision (SmartGovAI, green energy).
3. **Collaborative Future:** Success depends on the essential collaboration among the administration, academia (ULBS), the tech sector, and, most importantly, citizens.
4. **Final Appeal:** The green and digital transition is not a spectacle we attend, but a stage on which we are all invited to play a role.

Conclusion / Call to Action:

We invite you to be our partners in building a smarter and more sustainable Sibiu.

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EMERGING DISRUPTIVE TECHNOLOGIES:
Balancing Innovation, Risks, and Societal Impact



Thank You!

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marian.popa@sibiu.ro

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