UNDERSTANDING DIGITAL AND GREEN MUNICIPALITIES AND CITIES

SILVIA RUČINSKÁ, JOSEF BERNHART, FRANZISKA CECON, GEORGE CORNEL DUMITRESCU (EDS.)

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(eds.)

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Understanding Digital and Green Municipalities and Cities

Editors:
Silvia Ručinská[1], Josef Bernhart[2], Franziska Cecon[3], George Cornel Dumitrescu[4]

Authors:

Alina Cerasela Avram[4],	George Cornel Dumitrescu[4],	Ondrej Mitaľ[1],
Franziska Cecon[3],	Miroslav Fečko[1],	Simona Moagăr-Poladian[4],
Peter Decarli[2],	Belinda Hanner[3],	Dominik Prüller[3],
Andreea Emanuela Drăgoi[4],	Davide Maffei[2],	Silvia Ručinská[1]

1 Pavol Jozef Šafárik University in Košice, Faculty of Public Administration Košice, Slovak Republic
2 Eurac Research, Institute for Public Management, Bolzano, Italy
3 University of Applied Sciences Upper Austria, Linz, Austria
4 Institute for World Economy (IWE), Bucharest, Romania

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Foreword

The publication Understanding Digital and Green Municipalities and Cities is the result of the Digital Government for Green Municipalities and Cities – DiGreen project. The project is co-funded by the Erasmus+ Programme of the European Union.

The project has brought together experts from different universities and research institutions in a unique international consortium to address the problems of municipalities and cities. With experts from various countries and familiar with different policy frameworks and communal strategies, it has been possible to develop new perspectives on how municipalities and cities in Europe can respond to new trends and challenges and how they can adapt their policies and relations with their citizens. We do not address all the latest trends in the publication, but from the range of challenges we have chosen, particularly those that focus on digitalisation and climate change.

The publication is designed as an interdisciplinary knowledge base encompassing backgrounds, common topics and challenges relevant to communal policy, digitalisation at the level of municipalities and cities, and green transition topics. Digital and green backgrounds provide necessary contexts and explanations about digitalisation and digital transition, climate neutrality, and sustainability, and they highlight modern trends and challenges that municipalities and cities face during the digital and green transition. Common topics for municipalities and cities summarise a selection of current communal management approaches that can help municipalities and cities cope and deal with digital and green transition opportunities, possibilities, and potential risks. Digitalisation at the communal level presents modern approaches to digital communal transition, highlighting general information, importance and benefits, practical applications, limitations and challenges. Green transition at the communal level emphasises a representation of areas to be considered as an integral part of sustainable communal development, stressing out general information, importance and benefits, practical applications, limitations and challenges.

The main target groups of this publication are teachers and researchers, higher education students in public administration, political sciences and related disciplines, and professionals already working in the municipality or city self-government public bodies. The aim is to contribute to the scientific discourse and debate on the most urgent and relevant topics considering the digital and green transition, emphasising the communal level of governance. Students aspiring to work for a municipality or city can develop the knowledge needed in the digital transformation of society and climate neutrality. Professionals working in a municipality or city can develop their knowledge of digitalisation and climate neutrality to fulfil tasks within local public authority's activities.

We would like to thank the representatives of all the municipalities and cities who shared their good examples with us and the reviewers for their kind suggestions.

ABOUT THE PROJECT PROJECT RESULTS PROJECT TEAM

1 Digital and Green Backgrounds

1.1 Digitalisation and Digital Transformation

Authors: Belinda Hanner and Franziska Cecon

Introduction

Digital transformation is the permanent change of an organisation by implementing digital tools and new technologies due to strategic reasons. It impacts not only the internal level of organisations but also the external level in terms of the economy and society.

Continuous digital transformation aims to increase the efficiency and effectiveness of organisational processes and unleash the power of innovation. Essential technologies to implement digital transformation are, for example, Artificial Intelligence (AI), Virtual Reality (VR), the Internet of Things (IoT), big data, cloud technology, and blockchain technology. European governments are challenged to keep technological progress in line with European values.

Relevance for municipalities

Digital transformation profoundly influences the structures of the public sector. It affects municipalities, cities, and nations because it can ensure Europe's digital sovereignty. In municipalities, maintaining and increasing efficiency is the main aim.

When implementing digital transformation on the municipal level, the most essential areas of activity are the organisation itself, the human beings, and IT-related issues. Barrier-free accessibility to services and user-friendly design are key to user satisfaction.

A human-centred public administration should also focus on employees' experience. Training measures should improve staff autonomy, productivity, and agility at work. Skilled staff can guarantee high-quality public services to citizens.

Building a digital culture, which means establishing digital skills that enable people to use digital tools in their daily lives, goes hand in hand with a well-functioning digital public infrastructure (DPI), which ensures the successful realisation of digital transformation.

Summary

Digital technologies have evolved rapidly from the first steps of digitisation to the worldwide trend of continuous digital transformation. They are changing and affecting the global economy as well as the citizens on a large scale. Digital transformation can increase the efficiency and effectiveness of organisational processes and unleash the power of innovation. The public sector plays a key role in implementing digital technologies at any administrative level. Digital skills in the public sector can ensure Europe's digital sovereignty.

FULL VERSION IN ENGLISH

1.2 Climate Neutrality and Sustainability

Authors: Dominik Prüller and Franziska Cecon

Introduction

Climate change is one of the biggest challenges we face today. The planet's average temperature has risen due to the greenhouse effect, mainly caused by human activities like burning fossil fuels. This increase in temperature leads to melting glaciers, rising sea levels, and extreme weather conditions that affect both the environment and human beings.

Sustainability and climate neutrality are important goals for the future. They focus on reducing carbon emissions and trying to limit the negative effects of our activities for future generations. Sustainability involves environmental, social, and economic factors, ensuring our society continues functioning while protecting the planet.

Relevance for municipalities

Municipalities play a crucial role in promoting sustainability and climate neutrality. Local governments can significantly impact by adopting eco-friendly practices, such as using renewable energy sources in public buildings or using more energy-efficient technologies. Municipalities can reduce their reliance on fossil fuels by adopting renewable energy sources such as solar or wind power for public buildings. Municipalities can also impact by upgrading heating and lighting systems to use less energy.

Additionally, municipalities can reduce carbon emissions by improving public transportation and encouraging walking or cycling instead of driving by car. Also, municipalities can support climate neutrality by planting trees and creating green spaces.

Summary

The importance of addressing climate change is undeniable. Rising global temperatures and their impact on the environment require immediate action, which makes it necessary to focus on sustainability and climate neutrality.

Municipalities, with their ability to implement local policies, are of high importance for these efforts. By using renewable energy, reducing waste, and promoting eco-friendly practices, they can support the Transition towards a more sustainable future. This approach at the local level can significantly reduce emissions, protect natural resources, and create more sustainable communities.

FULL VERSION IN ENGLISH

1.3 Trends and Challenges of the Communal Digital and Green Transition

Authors: Miroslav Fečko, Silvia Ručinská and Ondrej Mitaľ

Introduction

Municipalities and cities are often the places of first contact with citizens. The important role of municipalities and cities is to secure the consistency of local public policies and their benefits for citizens and businesses. The municipal level of governance has a natural predisposition to face modern trends and challenges, which helps municipalities and cities enrich their functioning and improve the quality of communal life among local stakeholders.

Relevance for municipalities

The development of contemporary society creates and accelerates many challenges and trends at the municipal level of governance, such as digital transition, green transition, demographic change, inclusion, safety and security, infrastructure and services, housing, earning and living in the cities, as well as innovation and resilience.

Trends can be characterised as something discussed in society. They also represent the prediction of future development that will not harm the interests of municipalities and cities when they pay attention to them. A trend resonates in a given sphere of society, municipality, and city. Trends are, therefore, long-term topics that transform and develop over time.

Challenges can be described as obstacles or situations that test the ability of municipalities and cities to execute their competencies properly. The challenge is a complex of various issues that municipalities and cities cannot avoid. Thus, they cannot make their own decision as in the case of trends. Challenges can be caused by a concrete trend, but at the same time, they can combine aspects of several ongoing trends. Both challenges and issues can be expected or unexpected. Monitoring and evaluating trends will not prevent the emergence of challenges and issues. Still, it can help municipalities and cities prepare and have response policies for managing challenges and issues.

Summary

The main benefit of local self-government units´ responses to ongoing trends is that they represent a “toolkit” for managing current challenges and issues in our shifting and dynamic society.

At the same time, these responses can help municipalities and cities overcome challenges and issues in the future, the shape of which we currently cannot imagine. This mindset contributes to sustainable development and management of territory that goes beyond the election period.

FULL VERSION IN ENGLISH

2 Common Topics for Municipalities and Cities

2.1 Strategic Planning in Public Administration

Author: Dominik Prüller

Introduction

Strategic planning involves defining an organisation's goals and the steps required to achieve them. Therefore, a thorough analysis of the current situation is necessary, followed by setting clear goals for the future. After identifying the necessary activities to reach these goals, strategic planning focuses on the steps for practical implementation.

This process requires organisations to focus not only on theoretical ideas but also on how to achieve the previously set goals, considering factors such as budget, stakeholders, and legal requirements. Strategic planning also includes evaluating its success and adjusting the plan to ensure its effectiveness.

Resources, potential risks, and long-term impacts on both the organisation and its environment must be considered. Overall, strategic planning serves as a guide to help organisations stay organised, to set priorities, and to achieve their objectives.

Relevance for municipalities

For municipalities, strategic planning has gained importance since the 1980s. Today, municipalities are often forced by laws to set up strategic plans. It enables local governments to define their goals, prioritise actions, and allocate resources effectively. Through this approach, municipalities can identify areas that need improvement, such as digital services, public infrastructure, or sustainability. For instance, a municipality might use strategic planning to introduce online services or build energy-efficient infrastructure. This process allows administrators to allocate resources like budgets and staff efficiently while collaborating with stakeholders such as local businesses and community organisations.

However, municipalities often face challenges, such as conflicting interests among stakeholders and financial restrictions. Additionally, political changes, like a shift in local government leadership, can make the planning process less predictable.

Summary

Strategic planning is about setting goals and creating a plan to achieve them. It helps public administrations to figure out what they want to accomplish and how to do it. Strategic planning is vital because it helps prioritise efforts, maximise the outcome reached with limited resources, and adapt to changes. It involves defining a vision, setting goals, analysing the current situation, developing strategies and ideas to achieve the goals set, involving stakeholders, implementing the plan, and monitoring the implementation progress.

FULL VERSION IN ENGLISH

2.2 Process Management as a Prerequisite for Digitalisation

Author: Dominik Prüller

Introduction

Process management is about organising interconnected and interdependent, repetitive actions in organisations. Its core objective is to improve efficiency and effectiveness. By focusing on efficient workflows, process management aims to streamline operations and enhance the quality of service. It shifts the focus away from isolated departmental activities.

Relevance for municipalities

In public administration, process management is an important tool for making public service more efficient, especially when dealing with repetitive, monotonous tasks. Unlike in private organisations, processes in public administrations are typically driven by laws or other legal requirements, which is in line with the idea of process management, which is to have clearly defined processes.

Process management in municipalities can improve efficiency by reducing bureaucratic redundancies, simplifying workflows, and enhancing service quality. By optimising processes, municipalities can better allocate resources and ensure faster service delivery, thereby increasing the satisfaction of their citizens. However, it is important to note that poorly designed processes or overemphasis on process management can lead to inefficiencies, such as excessive administrative work. Process Management can also hamper creativity in solving problems, especially when new challenges appear.

A practical example of process management in municipalities is the dog tax registration process in Linz (Austria). This system standardises the steps required for dog registration, tax collection, and deregistration, providing a clear and efficient framework for new staff members. This streamlines the process and ensures consistency and transparency in public service.

Summary

Process management is an essential tool for improving organisational efficiency and ensuring the effective execution of tasks. The public sector allows municipalities to optimise workflows, reduce costs, and improve the quality of services provided. By fostering collaboration between departments and focusing on customer satisfaction, process management helps municipalities improve their administration. However, municipalities must be careful when implementing process management, as it can also lead to inefficiencies and hamper innovation. By continuously monitoring and improving their processes, municipalities can improve the quality of their services.

FULL VERSION IN ENGLISH

2.3 Empowering Municipalities with Effective Knowledge Management

Author: Davide Maffei

Introduction

Knowledge management (KM) refers to the systematic process of capturing, organising, storing, and utilising knowledge to enhance decision-making, problem-solving, and innovation in organisations. It involves both explicit (documented) and tacit (personal expertise) knowledge, aimed at improving overall organisational performance. Effective KM fosters collaboration, avoids redundant work, and helps capitalise on past experiences.

Relevance for municipalities

Municipalities benefit significantly from KM, as it aids in several crucial areas:

- Improved Policies: KM helps municipalities use data and insights to create more informed and effective policies.
- Efficient Services: Sharing best practices across municipal services, such as public safety, improves efficiency and reduces duplication.
- Knowledge Sharing: KM fosters interdepartmental coordination, reducing silos and encouraging holistic approaches.
- Emergency Response: Real-time knowledge sharing during crises ensures coordinated and informed decision-making.
- Capacity Building: KM supports employee development by preserving institutional knowledge and facilitating training programs.
- Better Decision-Making: Municipal leaders benefit from accessible data, enabling more effective, data-driven governance.
- Transparency and Engagement: KM makes information and policies transparent, fostering citizen participation and better engagement in local governance.

Summary

KM enhances municipalities' policymaking, service delivery, and crisis management efficiency while fostering transparency and engagement. It supports digital transformation and sustainability efforts by driving innovation and collaboration, allowing municipalities to serve their communities more effectively.

FULL VERSION IN ENGLISH

2.4 Public Engagement in Modern Municipalities And Cities

Author: Miroslav Fečko

Introduction

Public institutions' responses at all levels of governance should reflect the voices of people directly affected by contemporary challenges, such as climate change, energy transition, sustainable use of natural resources, urban and international migration, wealth distribution, labour market trends, skills requirements, coexistence issues, etc.

The voice of citizens is getting more important for public institutions and policymakers. In this regard, municipalities and cities intend to give room for the citizens to engage and jointly realise activities of public interest.

Relevance for municipalities

Public engagement, public involvement, and participation have the same or similar meanings. Participation can come from citizens only and can be described as participating in public institutions' activities. The term involvement corresponds with the intentional collaboration of both public institutions and the public. Public engagement requires active and intentional dialogue between stakeholders and decision-makers. Public engagement can be seen as the same activity as involvement but is based on beliefs, values, and individuals´ awareness of those who want to be engaged.

The diversity of engagement tools results from different factors, mainly the management's vision, socio-economic factors, the level of digitalisation, trust, communication and interactions between cities and citizens, public awareness of the importance of engagement, and the culture of transparency and openness in local self-government units.

Participatory budgeting, as the most used local democracy tool, allows communities to decide how a designated part of the public budget should be spent, helping local communities transform their ideas into practical results.

Engaged individuals and groups have the potential to mobilise other members of local communities, helping municipalities and cities improve the quality of life. Simultaneously, the contribution of engaged local stakeholders is also essential for the urban planning of modern municipalities and cities.

Summary

Public engagement can take different forms and goes far beyond attending periodic elections. Public and local governments should create opportunities and allow intentional and continuous collaboration between public institutions and citizens. Modern municipalities and cities should also utilise the potential and benefits of public engagement through various digital solutions.

FULL VERSION IN ENGLISH

2.5 Evidence-Based Policymaking as a Means of Improving Communal Life

Author: Miroslav Fečko

Introduction

Public policies aim to achieve a wide range of societal goals at all levels of governance. Theoreticians, politicians, and practitioners often consider evidence-based policymaking an important ideal. Public institutions have started collecting data (evidence) to help them identify the aspects of existing social reality and create good public policies. Municipalities and cities usually communicate and collaborate with stakeholders, mainly to recognise and satisfy stakeholders' needs based on collected evidence.

Relevance for municipalities

Evidence can affect the outcome and outputs of public policies. For municipalities and cities, the evidence usually includes experience and expertise, values and interests, habits and traditions, opinions of lobbyists and pressure groups, national policy content, and political objectives. Regardless of the different theoretical approaches used to explain the meaning of evidence, authors across the scientific disciplines argue that appropriate evidence is necessary for good public policies.

Evidence-based policymaking at the local level improves the quality of communal life, mainly thanks to better outcomes and outputs of local policies, higher trust in local authorities, enhanced interaction with local authorities, better public services, higher transparency and openness, better local accountability, and cost-effectiveness.

The digitalisation of evidence-based policymaking can be perceived as a necessary direction for future good policies. Digital technologies implemented by municipalities and cities usually can collect data, but some solutions naturally accumulate data. Thus, digital transition reformulates key aspects of evidence-based policymaking, mainly in data management, personalised information flows, legitimacy, strengthening resilience and fostering sustainable development.

Summary

Evidence-based policymaking can also be defined as a continuous process of improving the outcomes and outputs of public policies. Municipalities and cities should systematically create and revise evidence relevant to local policies. Collaboration with stakeholders can also be seen as an essential part of effective evidence-based policymaking at the communal level of governance.

FULL VERSION IN ENGLISH

2.6 From Crisis to Continuity: Enhancing Public Administration Resilience

Author: Peter Decarli

Introduction

This chapter discusses the growing importance of resilience in public administration, which is the ability of public systems to withstand, adapt, and recover from various disruptions while maintaining essential functions. Introduced by Wildavsky in 1988, resilience emphasises not only prevention but also the capacity to absorb and mitigate shocks. This concept is crucial in crisis management and involves recognising risks to prevent routine emergencies from escalating. A resilient public administration differs from traditional bureaucracies by having non-hierarchical networks, spare capacity for crises, diverse knowledge sources, stakeholder participation, and adaptive policy experimentation.

Relevance for municipalities

Resilience is discussed at multiple scales, from countries to households, emphasising the need for a holistic and inclusive approach. Local (municipal) actions must be supported by national frameworks to be effective, indicating that resilience strategies at different levels are complementary and interconnected.

Challenges faced by municipalities include industrial changes, economic crises, population migration, natural disasters, energy disruptions, and leadership changes. Modern public administration debates now focus on robustness, flexibility, and adaptability rather than just efficiency and equity.

On the municipal level, resilience refers to the amount of change the system can undergo and still retain the same controls on function and structure, the degree to which the system is capable of self-organisation, and the ability to build and increase the capacity for learning and adaptation.

Summary

Municipalities need to carefully manage the trade-offs between resilience, effectiveness, and legitimacy while adopting a broader approach to resilience beyond just crisis management.

There is no single model for building resilience in government. Diverse and flexible governance systems are essential, but increased diversity alone does not guarantee resilience. Competing models should be developed and tested to understand how resilience is created and eroded.

FULL VERSION IN ENGLISH

2.7 Public Integrity as a Complex Communal Level Guide

Author: Ondrej Mitaľ

Introduction

The relevance of high standards of public integrity principles is the logical consequence of their (non)compliance in contemporary democratic and legal states of the 21st century. Public integrity represents the set of rules, values, and principles that guide individuals and organisations in dealing with different ethical issues and problems.

Two generally accepted approaches can solve ethical issues in public administration. The compliance approach combines formal laws and regulations that strictly control and punish unethical behaviour. By contrast, the integrity-based approach aims to create a sustainable, ethical environment based on a high internal level of self-control supported by ethical training, education, and ethical values that go beyond compliance with laws. A shift to integrity-based ethics can characterise the last decade.

Relevance for municipalities

An integrity-based approach to the management of public institutions at the local level of governance combines two key dimensions: individual and organisational. The organisational level of public integrity can be seen as a precondition for the ethical behaviour of individuals. Individual level of public integrity must relate to values of individuals´ conduct, such as ethical conduct, honesty, honour, discipline, reporting misconduct, and discretion. However, both levels of public integrity in municipalities and cities cannot exist without accepting high standards of integrity across society.

Public integrity at the communal level can be perceived as a complex guide that leads individuals and cities in ethically complicated situations rather than abstract standards for behaviour and decision-making. The integrity-based approach uses internal control mechanisms to stimulate behaviour, such as training, education, ethical culture, and communication.

Digital technologies improve transparency and openness of the whole ethical management in many ways, mainly through the accessibility of sources, case studies, and good practice examples. Smart applications open new solutions for identifying and reporting unethical behaviour.

Summary

The main benefit of the integrity-based approach is that it leads to positive spillover effects. Integrity-based management is still an evolving approach that helps public institutions fight against corruption and other types of negative behaviour at all levels of governance.

FULL VERSION IN ENGLISH

2.8 Effective Municipal Communication with the Stakeholders

Authors: Alina Cerasela Avram and George Cornel Dumitrescu

Introduction

From the municipality's standpoint, communication with stakeholders means achieving consensus among all involved parties so the municipality's projects are successfully finalised. Price & Cybulski (2004) argue that achieving consensus implies communication, negotiation, conflict management, bilateral understanding, power dynamics, knowledge exchange, trust, corporate culture, collaboration, cooperation, and compromise. Therefore, consensus is based on open, controlled, and effective communication.

Relevance for municipalities

During the projects, municipalities develop communication with stakeholders as the key to finalising them as planned. According to Butt et al. (2016), ineffective communication creates confusion that leads to additional problems. Communicating with the stakeholders can help the decision-making process by considering their opinions on different aspects of the ongoing projects. A decision made considering stakeholders' insights can be easily implemented and accepted.

Keeping communication channels open can facilitate conflict-free cooperation by aligning stakeholders with project or policy objectives, thus increasing the likelihood of successful implementation. If conflicts still emerge, the municipalities can sort them out with the stakeholders.

A good track record of communication with stakeholders helps maintain a good reputation for the public administration, thus increasing its public image.

Summary

Communication with stakeholders allows municipalities and cities to implement their projects efficiently by involving the interested parties and collecting feedback from each beneficiary type. Stakeholders such as citizens, businesses, NGOs, government agencies, and mass media have diversified interests and priorities; addressing them helps achieve project goals. Digital tools and traditional interactions increase real-time interactivity and inclusivity.

Robust ethical guidelines and various cultural perspectives can help mitigate conflicts and foster cooperation, which is necessary for project success and sustainable development.

FULL VERSION IN ENGLISH

3 Digitalisation at the Communal Level

3.1 Open Data for Local Governments

Author: Silvia Ručinská

Introduction

Governments historically collected a wide range of essential and non-essential data at all levels of governance. The digital transition has transformed collecting, storing, processing, backing up, and sharing data at the local level. Open data represents an essential improvement in informational flows between public institutions and stakeholders. Different local stakeholders can access, use, and share open data, mainly to create additional social, economic, or environmental benefits and values.

Relevance for municipalities

Open data are usually created to improve transparency. At the same time, open data transforms citizens' roles from passive recipients to active co-producers of public services. In this regard, open data helps municipalities and cities develop and maintain engaged and resilient local communities.

Implementing open data also positively impacts the principles of good governance. The benefits of open data can be seen across public, private, and non-governmental sectors of society. Open data presents a qualitative level of traditional processes that strengthen the resilience of local communities, such as quality of public services, transparency, participation, and accountability. Municipalities and cities expand spheres of life that are covered by open data that is available to everyone.

Municipalities and cities share open data with the public through portals that offer different types of open data. Open data published at open data portals is usually categorised mainly to better guide local community members. Open data are published as datasets that can be reused for different purposes.

Summary

Open data brings many benefits but can be perceived as a big challenge for municipalities and cities. Municipalities and cities should avoid creating open data portals that offer traditional forms of data, such as PDF files or scanned pictures of documents. Open data and open data portals should support data reuse, mainly based on machine processing and using universally accepted data formats. Open data's primary purpose is to implement solutions that go beyond the legal requirements for making documents public.

FULL VERSION IN ENGLISH

3.2 Building Smart Cities: The Role of IoT in Urban Development

Author: Peter Decarli

Introduction

The Internet of Things (IoT) is a communication paradigm where everyday objects are equipped with microchips and communication transceivers, enabling them to interact with users and each other via the Internet. This aims to make the Internet more ubiquitous and facilitate the development of various applications by leveraging vast amounts of data from devices like household appliances, sensors, and vehicles. In urban contexts, IoT supports the Smart City concept, which aims to optimise public resources, improve service quality, and reduce public administration costs. Urban IoT achieves this by providing uniform, economical access to public services, enhancing transparency and efficiency.

Relevance for municipalities

Urban IoT can bring several benefits in the management and optimisation of traditional public services. Examples include individual and public transportation, parking management, public lighting and surveillance, maintenance of public spaces, preservation of cultural heritage, waste collection, public health care and education.

In addition, the data collected by urban IoT can also be used to increase transparency and promote the actions of local government towards citizens, increase people's awareness of the state of their city, stimulate active citizen participation in the management of public administration, and also inspire the creation of new services based on those provided by the IoT.

Summary

IoT is pivotal in developing smart cities by connecting everyday objects and devices to the internet, enabling them to communicate and share data. This connectivity enhances urban living by optimising resource use, improving public services, and increasing efficiency. Smart cities leverage IoT for various applications, including smart grids, intelligent traffic management, healthcare, and environmental monitoring.

However, implementing IoT in smart cities faces challenges such as political decision-making, technical interoperability, and financial constraints. Overcoming these barriers involves strategic planning, developing unified ICT platforms, and focusing on services with clear social benefits and returns on investment. Additionally, addressing privacy concerns through robust security measures and transparent data practices is crucial for the successful integration of IoT in urban environments.

FULL VERSION IN ENGLISH

3.3 Data Management for Smooth Technological and Sustainable Growth

Author: Andreea - Emanuela Drăgoi

Introduction

Data management refers to systematically organising, storing, and maintaining data to ensure its accuracy, accessibility, reliability, and security. In modern economies, effective data management is essential for supporting decision-making, enhancing operational efficiency, ensuring regulatory compliance, and fostering innovation.

The rise of big data, characterised by vast volumes of structured and unstructured data generated at high velocity from diverse sources, has further emphasised the importance of robust data management practices. Against this background, protecting users' identity and personal data is paramount, as breaches can lead to significant financial losses, reputational damage, and legal consequences.

Relevance for municipalities

Effective data management is crucial for safeguarding personal information, maintaining user trust, and ensuring the secure operation of modern economies. It mitigates the risks associated with data breaches and ensures compliance with legal standards, thereby protecting both organisations and individuals in the digital age. Data management may drive economic success, helping municipalities improve information accuracy, fuel digital transformation, and power new technologies and business models.

Technologies such as artificial intelligence (AI), machine learning, Industry 4.0, advanced analytics, and the Internet of Things (IoT) rely on timely, accurate, and secure data to function effectively. Proper data management ensures that municipalities may operate with these technologies optimally, driving technological advancements and supporting the development of novel business models.

As the digital economy evolves, effective data management will remain indispensable for all municipalities' smooth and secure operations. It will enable them to harness big data, gain valuable insights, and drive innovation, all while ensuring compliance with legal standards and protecting user privacy.

Summary

Data management is critical for driving innovation, sustaining economic growth, and maintaining a competitive edge in the digital age. It supports digital transformation, powers new technologies, and fosters the development of novel business models. By prioritising user privacy and ensuring data security, municipalities may build stronger relationships with citizens, create a secure digital environment, and achieve sustainable growth in a rapidly evolving digital landscape.

FULL VERSION IN ENGLISH

3.4 Safeguarding Digital Governance: Balancing Technology and Human Factors

Author: Davide Maffei

Introduction

Public administrations increasingly rely on digital systems, making cybersecurity a critical concern. Information systems' security involves technical solutions and the human element, as personnel are frequently targeted in cyber-attacks. Despite the awareness of these threats, many administrations prioritise technical solutions, overlooking the human vulnerabilities.

Relevance for municipalities

Municipalities, particularly smaller ones, face challenges in maintaining secure information systems due to limited resources and a lack of specialised personnel. The rapid digitalisation of public services requires municipalities to prioritise cybersecurity by investing in employee training. This training should cover advanced technical skills and basic digital literacy. Innovative training methods, such as context-aware and game-based learning, provide engaging ways to improve security awareness and offer real-time, relevant security information based on employees' activities. In 2003, Desman outlined ten aspects of successful security training:

- Information security as a people issue, not just a technical one,
- Training language should be tailored to users,
- All users should participate in training to raise awareness,
- Training should have clear goals,
- Training should be engaging and enjoyable,
- Training should be concise,
- Recipients should understand the benefits of behavioural changes,
- Utilise existing resources within the organisation,
- Training should be formalised,
- Training should address the latest information security developments.

Summary

Effective security in public administration is a balance between technology and human factors. Municipalities must implement robust technical solutions and ensure personnel are well-trained in cybersecurity practices. By focusing on both technical tools and human training, municipalities can build resilience against evolving cyber threats and maintain the integrity of public services.

FULL VERSION IN ENGLISH

3.5 Artificial Intelligence as a Topic of Communal Interest

Author: Silvia Ručinská

Introduction

Artificial intelligence (AI) is already being implemented and impacting many important sectors of our society, including finance, healthcare, data management, industry development, job performance, and education. Simultaneously, artificial intelligence represents one of the key challenges for our society, governance, and policymaking.

AI-based solutions should be seen as essential tools for public institutions to improve the quality of life. However, the benefits and limits of artificial intelligence have not been examined satisfactorily so far.

Relevance for municipalities

Artificial intelligence can potentially improve the execution of competencies at the communal level. Municipalities and cities may benefit from implementing AI-based solutions in many different aspects, mainly by automating operations, reducing human error, making effective data-driven decisions, and automating efficient urban management. The same AI-based solution may have different impacts on various stakeholders.

AI tools are not an outcome in themselves or a goal for itself to be achieved. Municipalities and cities should assess the economic efficiency of AI-based solutions. Digital skills in understanding AI is another challenge for municipalities, cities, elected representatives, and members of local communities. Artificial intelligence can limit human error or notice potential mistakes.

Municipalities and cities should maximise the potential benefits of AI-based solutions for public institutions and other stakeholders from local communities. Contrary to the benefits of AI-based solutions, municipalities and cities should consider their limits

Summary

AI-based solutions must be perceived as part of municipalities' and cities' general approach to improving local governance and quality of life. Artificial intelligence has different positive impacts in this regard, but its implementation must be discussed and accepted by the local community and its stakeholders.

Municipalities and cities should be aware of the automatic application of AI-based solutions because of their modernity and growing trend. Applying AI-based solutions at the communal level should primarily improve citizens´ quality of life and deal with challenges the local community faces.

FULL VERSION IN ENGLISH

3.6 Digital Public Services: Redefining Citizen-official Interactions

Author: Peter Decarli

Introduction

Central to both traditional and digital public services is the public encounter, which is the interaction between citizens and public officials to conduct business. Traditionally, this interaction involves exchanging information or services and can include elements of control or coercion, with clearly defined roles for both parties. With the digitisation of public services, the media, communication channels, and settings of these public encounters are evolving, altering our understanding of these interactions.

Relevance for municipalities

Globally, public sector organisations are increasingly adopting digital technologies to enhance public service delivery. Innovations like data mining, machine learning, sensor technology, and service automation are creating new opportunities for digitisation. A key concept driving this transformation is citizen self-service, enabling easy access to government data and services from home. Additionally, digitisation aims to streamline internal government processes, improving efficiency and citizen interactions.

Digital public services are crucial for modernising municipalities, enhancing citizen interactions, achieving sustainability goals, and transforming traditional bureaucratic organisations into smart cities and communities.

Summary

Digital public services transform how municipalities interact with citizens by enhancing accessibility, efficiency, and convenience. These services allow citizens to access government data and services from anywhere with internet access, supporting the concept of citizen self-service. The roles of public officials are evolving, with digital technologies taking over routine tasks, allowing officials to focus on complex issues requiring human judgment. However, this shift also raises concerns about data privacy and the potential exclusion of less tech-savvy citizens.

Municipalities must balance leveraging data for service improvement, protecting citizens' privacy and ensuring equitable access. Digital public services are essential to modernising municipalities, turning them into smart cities and communities, fostering better communication and engagement, and contributing to sustainability goals.

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3.7 Modern Ways of Local Communication Utilizing ICT

Author: Ondrej Mitaľ

Introduction

The complexity of communication processes has constantly evolved. One of the essential challenges shaping society's future development is how we handle the intensive flow of information and data. In this regard, modern communication methods based on new digital technologies are changing the way we search, read, understand, store, and reuse information and data.

Relevance for municipalities

As a result of the digital transition and intensive use of digital technologies, municipalities and cities must implement innovative and new solutions demanded by different stakeholders. This challenge is even more complex if we consider the ambition of municipalities and cities to communicate with private companies and non-governmental organisations, citizens and tourists, young and older people, and many other entities.

Social media can be perceived as a usual platform for communication and searching for information. The level of interest in using social media differs among the municipalities and cities. However, social media represents just an additional and not the only platform for communication between public institutions and citizens.

Public institutions also reflect the trend of smart apps. Apps may be available on different levels of sophistication, from basic informational apps to full public e-service apps. Municipalities and cities should decide between universal apps that cover a wide range of public services, or they can also develop several specific apps such as informational apps, security apps, tourist apps, bike and car sharing apps, parking apps, and environmental apps.

Chatbots represent another modern way of communication used by public institutions. Chatbots usually create 24-hour informational services that operate thanks to AI-based tools. Chatbots still represent brand-new digital solutions for the communal level. Considering the usual habits and conditions of a particular local community, municipalities and cities have to consider the perceived benefits of chatbot implementation.

Summary

The primary goal of modern ways of communication is to serve as important complementary communication platforms rather than primary ones. However, modern ways of communication have several key benefits, information and data can be shared almost immediately, they are available 24 hours a day, seven days a week, as well as they have the potential to save administrative staff working hours, and foster remote two-way interaction.

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4 Green Transition at the Communal Level

4.1 Sustainable Urban Transportation

Authors: Alina Cerasela Avram and George Cornel Dumitrescu

Introduction

Sustainable transportation should be the opposite of the current polluting fossil-fuel-based one and involve environmentally friendly systems, practices and modes that are environment-friendly and generate less noise and pollution.

Sustainable transportation aims to create a better, healthier environment. It reduces dependencies on mineral fuels and other resources that are sometimes difficult to procure and whose production harms the earth. It is one of the steps required to stop global warming, a problem we all share. The EU strategy seeks to foster a higher uptake of zero-emission vehicles, a better infrastructure, and more significant innovation in areas such as automation and artificial intelligence (European Commission, 2023).

Relevance for municipalities

Transitioning to sustainable transportation within municipalities is complex and involves significant budgets and an essential change in citizens' behaviour. The most common way is replacing propulsion based on fossil fuels with a green one powered by renewable energy, such as electric engines fuelled by electricity from batteries, solar panels, fuel cells, or hydrogen-based combustion, or promoting walking, biking, ridesharing, and bike-sharing programs that reduce the transportation used. Municipalities could design communities where walking is the first option and green public transport is an alternative for longer routes.

Promoting green public transportation to various destinations of interest to all citizens reveals its inclusiveness and social equality benefits. It enables innovative municipal development by reducing the need for individual polluting transportation means, freeing traffic and making the localities more attractive and liveable. The essential argument of the transition from the classical one is its impact on energy security, being known that modern transportation involves reducing fossil-fuel consumption, helping the EU achieve its open strategic autonomy.

Summary

Sustainable transportation is one of the EU's priorities for zero emissions, open strategic autonomy, and a more liveable Europe for all its citizens. Achieving sustainable transportation is costly for municipalities as it implies diverting resources for other priorities, changing citizens' behaviour and creating compact, walkable neighbourhoods and civic places.

The benefits for municipalities are excellent, as they translate into less congested traffic, more active citizens, and a better quality and healthier life.

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4.2 Advocating Green Buildings in the Municipal Landscape

Author: Andreea - Emanuela Drăgoi

Introduction

Green buildings are designed to minimise or eliminate environmental impact through careful design, construction, and operation planning. These buildings prioritise energy efficiency, renewable energy use, water conservation, sustainable materials, and waste reduction.

Green buildings also focus on enhancing occupant well-being, environmental conservation, and reducing CO_2 emissions. Bioclimatic design is mandatory for green buildings. The bioclimatic design principles include shading from the summer sun and collecting the winter sun with a thoughtful orientation of the building and placement of the windows and skylights, indoor lighting designed to ensure a safe, productive, and warm environment with a minimum amount of energy use and designs that provide natural daylight enters the building while minimising the energy consumption.

Relevance for municipalities

Using one of the EU's green building rating systems, many of which rate the materials used for construction to reduce energy consumption, municipalities may support various projects for green buildings, hence gradually achieving minimum energy consumption in European cities. Municipalities should support more green building practices in their residential areas, encouraging measures that reduce energy demand in buildings due to decreased occupancy, altered working patterns (such as remote work), and changes in heating and cooling requirements.

While greenhouse gas emissions from EU buildings decreased by 31% between 2005 and 2021, municipalities may further encourage this trend by setting higher energy efficiency standards for new buildings, improving energy efficiency in existing buildings, decarbonising the electricity and heating sectors, and lowering temperatures. However, despite their advantages, municipalities should be warned that challenges remain in green building construction, such as the need for integrated design, fire safety concerns, and perceptions of high costs.

Summary

The concept of green buildings has evolved to focus on minimising or eliminating environmental impact through design and operational processes. While these buildings offer enduring environmental and economic benefits beyond the initial construction phases, challenges remain. Key issues include the need for integrated design approaches, fire safety considerations, and perceptions of higher costs associated with green technology.

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4.3 Renewable Energies Powering Municipalities and Cities

Authors: Andreea - Emanuela Drăgoi and Simona Moagăr-Poladian

Introduction

Renewable energy (RE) is derived from natural processes that are continuously replenished, making it a crucial component of sustainable development. Unlike fossil fuels, which are finite and environmentally damaging, renewable energy sources — such as solar, wind, biomass, hydraulic, geothermal, and hydrogen energy — are abundant, sustainable, and have a significantly lower environmental impact.

The European Union (EU) has been leading the charge in promoting RE to reduce greenhouse gas emissions, enhance energy efficiency, and meet its sustainability targets. This commitment is reflected in key EU frameworks like the Renewable Energy Directive, the Fit for 55 Package (which proposes a 55% reduction in greenhouse gas emissions by 2030), and the European Green Deal (which aims to make the EU climate-neutral by 2050).

Relevance for municipalities

Municipalities should promote the use of RE in cities and residential areas to meet energy needs, reduce greenhouse gas emissions, and promote sustainability. Solar energy, for example, may be utilised in residential solar panels that homeowners can install on rooftops to generate electricity, thereby reducing reliance on grid power and lowering utility bills. Hydroelectric power, another vital source of RE, may be used to store energy by pumping water to a higher elevation during low-demand periods and releasing it to generate electricity when demand peaks.

Biomass energy can be particularly effective in regions with significant agricultural activity. Tidal energy, generated from ocean tides, is another form of RE with potential for coastal communities. Tidal power plants capture the kinetic energy from tidal movements to generate electricity, offering a predictable and reliable power source compared to other intermittent RE sources. Despite these various practical applications, the widespread adoption of renewable energy in the EU faces several obstacles, such as the intermittent nature of many RE sources. To address this, the municipalities should support investment in robust energy storage solutions like batteries or pumped hydro storage and encourage advanced grid integration strategies to manage fluctuations in supply and demand. Also, while operating costs are relatively low, the initial expenses can be prohibitive without sufficient subsidies or financial incentives that some municipalities could provide.

Summary

While the EU has made significant strides in promoting renewable energy, substantial challenges must be addressed to meet its ambitious targets. Overcoming these challenges will require coordinated efforts from all stakeholders, including governments, municipalities, businesses, and civil society, to advance renewable energy technologies, implement effective policy measures, and promote sustainable practices.

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4.4 Local Communities Benefiting from Circular Economy

Author: Dominik Prüller

Introduction

A circular economy aims to ensure that resources are used more sustainably. In the traditional economy, raw materials are used to make products; when they're no longer useful, they're thrown away. This results in the waste of valuable resources and harms the environment. This approach is not sustainable, becoming even more apparent with a growing population and increasing consumption.

The circular economy aims to change this by creating a system where materials are reused, repaired, and recycled instead of disposed of. The goal is to reduce waste and better use resources.

Relevance for municipalities

Municipalities are in a pivotal position to realise a circular economy. Local Governments manage waste, resources, and energy for their municipalities. Also, by promoting recycling, reducing waste, and encouraging the reuse of products, municipalities can play an important role in this transition. For example, initiatives like the "Kostnix-Laden" in Austria allow people to exchange goods for free, reducing the need to buy new items. Another example is the "Öli" project, where used cooking oils are collected and recycled into eco-friendly biofuels.

Municipalities can also promote sustainability by purchasing environmentally friendly products and services from third parties. This reduces waste and sets an example for local businesses and residents. By collaborating with community groups, local businesses, and other stakeholders, municipalities can also spread awareness and support the development of a circular economy in their area.

Summary

Circular economy is about shifting from the traditional "take, make, dispose" system to one where products are reused, repaired, and recycled, helping to reduce waste and conserve resources. Municipalities play a crucial role in making this happen by supporting recycling initiatives, promoting sustainable consumption, and setting a good example. By doing so, they can help reduce environmental impacts, improve resource efficiency, and create a more sustainable future.

FULL VERSION IN ENGLISH

4.5 Local Significance of Food Waste Management

Author: Peter Decarli

Introduction

Over the past decade, food waste prevention has gained significant attention due to the alarming amount of food wasted globally—about 1.3 billion tonnes annually, or one-third of all food produced. Food waste undermines efforts to combat hunger and malnutrition, contributes to economic losses, and has severe environmental impacts, accounting for 8-10% of global greenhouse gas emissions.

The United Nations' Sustainable Development Goals include Target 12.3, which aims to halve global food waste per capita by 2030. Cities and municipalities play a crucial role in achieving this goal by implementing food waste reduction programs and educating citizens on best practices.

Relevance for municipalities

While many municipalities worldwide recognise the importance of preventing food waste, it remains a low priority for most. Food waste prevention often competes with other pressing issues that need attention and resources from local governments. Many local policymakers may not realise this area's potential for municipal action. Research in Bavaria showed that up to half of the municipalities viewed their ability to prevent food waste as low or very low. Understanding how food waste is perceived as a public problem needing local attention is crucial for effective prevention efforts.

Summary

Food waste management is crucial at the local level due to its significant environmental, economic, and social impacts. Municipalities play a vital role in addressing this issue through various strategies and actions. Effective local management can reduce greenhouse gas emissions and conserve natural resources like water and energy. Economically, reducing food waste leads to cost savings for both municipalities and residents while supporting local economies by promoting efficient resource use. Socially, tackling food waste helps combat hunger and improve food security within communities, raising awareness about sustainable practices and responsible consumption.

Municipalities can create and enforce local policies, lead educational campaigns, support local initiatives, and set an example by implementing food waste reduction practices within their own operations. By leveraging their unique position, municipalities are key players in the fight against food waste, influencing and implementing effective local strategies.

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Concluding Remarks

The DiGreen Knowledge Base can be used as a resource for digitalization and climate neutrality in municipalities and cities. The project aims to close skills gaps and promote collaborations between different stakeholders interested in sustainable development by providing extensive and accessible knowledge about it.

The wide range of subjects covered, including digital transformation, sustainable mobility, data management or renewable energies, considers the fact that digitalization and sustainability are key challenges faced by public administrations today. Each section of this knowledge base has been designed to give useful insights, practical strategies and examples of best practices.

This knowledge base also deals with the need of public administrations to be resilient. New ways of communicating and

open data are covered as well, as they are important for promoting transparency and trust between governments and citizens, and therefore making public services more effective. Moreover, introducing new technologies, like the Internet of Things (IoT) and artificial intelligence, creates new opportunities for innovations in public administration.

This project result also tackles key sustainability issues. It covers green buildings, renewable energy, circular economy and food waste reduction. These areas play a crucial role in reducing environmental damage and building a sustainable future.

The DiGreen Knowledge Base should serve as a helpful tool for students, professionals, and staff in municipalities. We hope that this resource will inspire and guide municipalities in their efforts in digitalization and climate neutrality.

ABOUT THE PROJECT

Project details

Programme: Erasmus+
Action Type: KA220-HED - Cooperation partnerships in higher education
Call: 2021
Round: Round 1
Field: Higher Education
Project Title: Digital government for green municipalities and cities
Project Acronym: DiGreen
Project number: 2021-1-SK01-KA220-HED-000023505
Duration: 01. 11. 2021 – 31. 10. 2024
Total Budget: 324 810 Euro
National Agency: Slovenská akademická asociácia pre medzinárodnú spoluprácu (Slovak Academic Association for International Cooperation)

Project coordinator

Univerzita Pavla Jozefa Šafárika v Košiciach, Fakulta verejnej správy (Pavol Jozef Šafárik University in Košice, Faculty of Public Administration, Slovakia)

Project partner organisations

Accademia Europea di Bolzano (Eurac Research, Italy)
Institutul de Economie Mondiala (The Institute for World Economy, Romania)
FH OO Studienbetriebs gmbh (University of Applied Sciences Upper Austria, Austria)

Project scope

DiGreen aims to provide professionals working in the municipality/city self-government public bodies and young citizens (students) with a framework to exchange knowledge and digital and green good practices. DiGreen will provide a crosscutting teaching and education DiGreen concept together with a multidimensional curriculum.

DiGreen will facilitate the exchange among an international network of municipalities and cities, municipalities' employees, universities, research institutions and communal practitioners on learning about green digital skills and other environmental and digital issues.
The general objective of the DiGreen project is to establish a transnational collaboration between partners involved and apply innovative approaches for addressing their target groups.

Project results

Project result 1.: Handbook of DIGITAL good practice – cities and municipalities as the source for viable solutions.

- The "digital" handbook is a source of good practice in providing digital services at the municipality/city level. Partner municipalities and cities cooperating with the consortium are the primary sources of good examples,
- Project result activities 01.12.2021 – 28.02.2023.

Project result 2.: Handbook of GREEN good practice – cities and municipalities as the source for viable solutions.

- The “green” handbook is a source of good practice for municipalities and cities’ employees as key drivers for a green and sustainable environment. Partner municipalities and cities cooperating with the consortium are the primary sources of good examples,
- Project result activities 01.01.2022 – 31.03.2023.

Project result 3.: Crosscutting teaching and education DiGreen concept.

- The teaching and education concept is an interdisciplinary educational and life-long learning knowledge base that encompasses content for developing knowledge in the field of digitalisation and climate neutrality,
- Project result activities 01.02.2023 – 30.06.2024.

Project result 4.: Multidimensional DiGreen Curriculum.

- The curriculum is usable in its entirety or at the level of particular specific modules for higher education covering digitalisation and climate neutrality topics,
- Project result activities 01.08.2023 – 31.08.2024.

https://bit.ly/digreen-project

CONTRIBUTORS

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Editors:	Silvia Ručinská Josef Bernhart Franziska Cecon George Cornel Dumitrescu
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