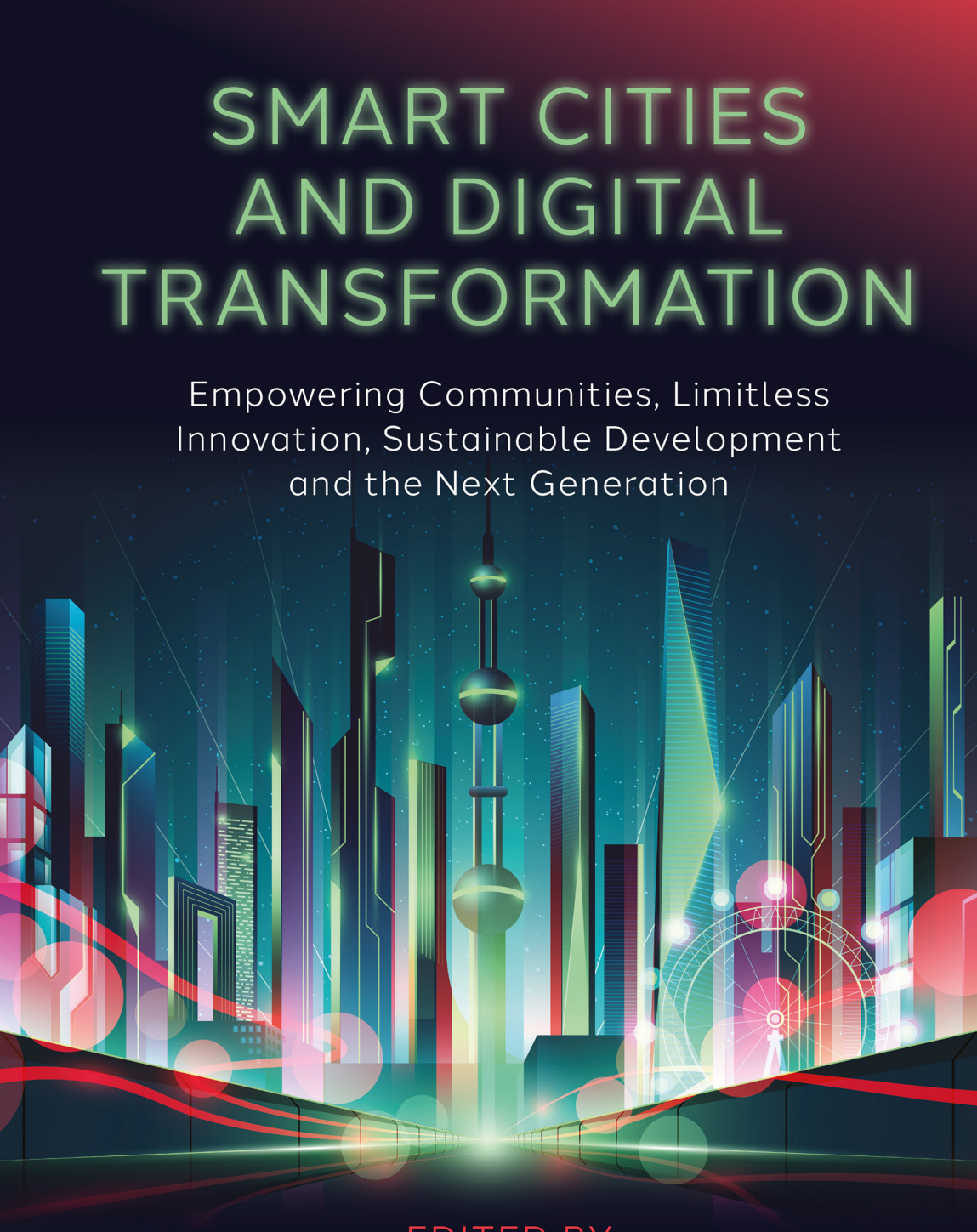
SMART CITIES AND DIGITAL TRANSFORMATION

Empowering Communities, Limitless Innovation, Sustainable Development and the Next Generation



EDITED BY

Miltiadis D. Lytras
Abdulrahman A. Housawi
Basim S. Alsaywid

Smart Cities and Digital Transformation

This page intentionally left blank

Smart Cities and Digital Transformation: Empowering Communities, Limitless Innovation, Sustainable Development and the Next Generation

EDITED BY

MILTIADIS D. LYTRAS
Effat University, Saudi Arabia

ABDULRAHMAN A. HOUSAWI
Saudi Commission for the Health Specialties, Saudi Arabia

AND

BASIM S. ALSAYWID
Saudi National Institute of Health, Saudi Arabia

United Kingdom – North America – Japan – India – Malaysia – China

Emerald Publishing Limited
Howard House, Wagon Lane, Bingley BD16 1WA, UK

First edition 2023

Reprints and permissions service
Contact: permissions@emeraldinsight.com

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

ISBN: 978-1-80455-995-6 (Print)
ISBN: 978-1-80455-994-9 (Online)
ISBN: 978-1-80455-996-3 (Epub)

ISOQAR certified Management System, awarded to Emerald for adherence to Environmental standard ISO 14001:2004.

Certificate Number 1985
ISO 14001

INVESTOR IN PEOPLE

To our kids, the next generation with the hope and the wish to live in a better world full of happiness

This page intentionally left blank

Contents

This page intentionally left blank

List of Figures and Tables

Figures

Tables

This page intentionally left blank

About the Authors

Basim Alsaywid is a Pediatric Urologist in Urology Department at King Faisal Specialist Hospital and Research Center, Riyadh and the Director of Education and Research Skills at Saudi National Institute of Health, Riyadh, Saudi Arabia.

Alfonso Annunziata is Post-doctoral Researcher in Urban and Regional Planning at the University of Cagliari (DICAAR). He participated in national and international research projects. The areas of his research include the landscape of infrastructure and the usability of urban spaces, in particular, from the perspective of the elderly and children.

Zainal Arifin is Executive Vice President of Engineering and Technology PLN, Indonesia. Recently, he is Chairman of PLN Smart Grid Implementation (from 2016) and Team Leader of Electric Vehicle Infrastructure Development in PLN (from 2013). He is also Senior Lecture at Power and Renewable Energy Department of Institut Teknologi PLN and System Engineering Graduate Program of Universitas Indonesia. He received a BSc in Mechanical Engineering from Sepuluh Nopember Institute of Technology, Indonesia. He earned his MBA in Operation Management from the University of Missouri – St. Louis, USA, and a PhD in Strategic Management from Universitas Indonesia focusing on Corporate Technology Strategic Policy. He is the Board Member of Global Smart Energy Federation, Indonesia Electricity Power Society, and Indonesia Strategic Management Society. He is also a senior member of IEEE Technology and Management Society.

Sagnik Bhattacharjee, MSc., graduated with a Masters in City and Urban environment with a specialization in Atmosphere, Water and Urban Environment from Ecole Centrale Nantes, France in 2018. He is passionate about urban resilience to climate change impacts, environmental impact in urban ecosystem, and the use of nature-based solutions to mitigate the impact of climate change in cities. In 2018, he co-founded ECOTEN Urban Comfort s.r.o., an urban environmental consultancy focused on the climate adaptation of cities and is currently working there as the CTO. He conceptualized the measurement of urban heat vulnerability index (UHVI) which was mentioned in the European Handbook for SDG Voluntary Local Reviews 2020 published by the Joint Research Centre of the European Commission as an exemplary indicator for European cities willing to take action on SDG goals through voluntary local review. He manages the urban heat vulnerability assessment services with GIS and remote sensing technology for measuring the UHVI for city planners and urban developers and the

urban microclimate simulation assessment services with the urban environmental software suite SOLENE-microclimat for urban development stakeholders. He is also managing the commercial development of the SOLENE-microclimat and the development of API services for urban heat vulnerability assessment with funding from ESA BIC Czech Republic. He is responsible for the integration of new methods, frameworks and technologies to optimize the assessment of climate change vulnerability and develop NBS based urban design for urban resiliency for cities. As of 2023, he is the author or co-author of 3 scientific papers and is also leading the participation of ECOTEN urban comfort s.r.o. for Horizon Europe project "Re-Valuing Urban Quality & Climate Neutrality in European Waterfront Cities" co-funded by the European Union.

Viktor Benes, Ing., MSc., received a master's degree in Intelligent Transportation Systems at the Faculty of Transportation Sciences, Czech Technical University in Prague, and a second master's degree in Transportation Systems Engineering at the Faculty of Science and Engineering, Linkoping University. Since 2021, he is a doctoral student at Czech Technical University in Prague, Faculty of Transportation Sciences in the Smart City study program. Parallelly he works as a manager of Smart City solutions in a public company Operator ICT, Inc. that is focused on innovative projects for Prague. In his research, he is focused on the Digital Twin. In this research, the Digital Twin uses ontologies as semantic interoperability between different city domains and usage knowledge graphs for the proper set of connections and relationships between ontologies and their datasets. The research is actively consulted with city managers and representatives of the data platform of the capital city called Golemio.

In his professional career, he has been working on innovative projects in the city of Prague. He is a member of the committee of the Sustainable Mobility Plan of the Capital City of Prague and its surroundings, he works on innovative projects such as the Intermodal Route Planner (MaaS), Mobile Monitoring of the elements of the public space, projects connected with micro and active mobility and C-ITS elements and their usage.

Kamila Borseková is the Research Coordinator at UMB and the Head of Research and Innovation Centre at the Faculty of Economics with a profound interest in urban and regional topics. She is an Associate Professor at the Faculty of Economics and her main scientific research is in the field of smart and creative cities, resilience, and sustainable urban and regional development. She has extensive research experience from dozens of national and international research projects related to smart, creative, and resilient cities, urban and regional development, strategic planning, and policy. She has authored and co-authored more than 100 scientific publications, including scientific articles, chapters, studies, and books.

Martina Bosone, Architect and PhD in Sustainable Technologies, Recovery and Representation of Architecture and the Environment, at the Department of Architecture of the University of Naples "Federico II," is a Research Fellow at the Research Institute on Innovation and Development Services (IRISS) of the National Research Council (CNR) since 2018 in European Horizon 2020 research projects. She carries out research activities about the development of innovative methods and tools

for assessing the multidimensional impacts of functional reuse and regeneration of cultural heritage and landscapes in the perspective of the circular economy. In particular, she is involved in activities for the sperimentation of innovative models and tools for the shared management of cultural heritage as a common good. She is also Member of the Research Laboratory on Human-centred, Creative and Circular City of CNR IRISS. Since 2016, she is Member of national and international organizations involved in the conservation and valorization of cultural heritage.

Marianna Cavada is a Lecturer in Urban Design Policy at Beyond Imagination, School of Architecture, Lancaster Institute for Contemporary Arts LICA, at Lancaster University. Her research focuses on smart cities, urban systems engineering, and design for urban policy. She is using an engineering approach to apply ingenious solutions to urban challenges. She is teaching at the School of Architecture, where she is the Module Convener for Architectural Humanities; she is the PhD program convenor and teaches Studio in year 2. She holds a BA Hons., Dip Arch in Architecture (Higher Commendation), and a PhD in Civil Engineering from the Engineering Department, University of Birmingham, UK. She practiced Architecture internationally and has been involved in large urban developments in the UK, UAE, and China. She has published in academic journals and conference proceedings on smart cities, policy design, and urban engineering.

Alana Corsi is a PhD student and has a Master's degree in Production Engineering, both from the Federal University of Technology (UTFPR, Brazil). She is a Specialist in Logistics and Operations Management and Bachelor in Production Engineering at the Maringá State University (UEM). She has a scholarship from Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES). She is a Member of the Research Group Technology Transfer Management and Smart Cities. Her research interests are technologies, smart cities, smart citizens, sustainable development, and technology transfer.

Giulia Desogus is a Post-doctoral Researcher in Urban and Regional Planning at the University of Cagliari (DICAAR). Her research interests are focused on territorial planning and its tangible consequences in society, cohesion policy, and Island Territorial Co-operation.

Weronika Dopierała-Kalińska graduated in Journalism and Social Communication. She is currently a PhD student in Social Communication and Media Studies at Adam Mickiewicz University in Poznań, from March 2018 to August 2020, a Specialist in Promotion and Social Media in the Office of the Mayor of Poznań City Hall. Areas of scholarly interest revolve around media content, agenda setting, online media, online information, or local communication.

Emilija Stojmenova Duh, PhD, is Associate Professor at the Faculty of Electrical Engineering, University of Ljubljana, Slovenia. Her research work focuses on user centered design, design thinking, open innovation, and digitalization for rural development. She is a Coordinator of FabLab Network Slovenia and the Director of Digital Innovation Hub Slovenia.

Kartika Asri Elnur is Vice President of Change Management Office ICON+, a subsidiary of PLN Indonesia. She is Team member of PLN Smart Grid Implementation (from 2016), and Team member of Business Process Management Innovation Committee PLN Research and Development (from 2020). She has worked in IT strategy and infrastructure, energy digital business analysis, and power ICT development including smart meter since 2014. She received Bachelor's degree in Informatics from Sepuluh Nopember Institute of Technology, Indonesia. She earned her Master's degree in Business Information System from Monash University – Melbourne, Australia.

Miguel Angel Alor Flores is a member of the Expert Working Group from the G20 Global Smart Cities Alliance led by the World Economic Forum and Center for the Fourth Industrial Revolution. He is a Project Manager at Govtech Peru, a CSO that aims to highlight the usefulness of technology in the public sector. He is a Professor of the specialization in Digital Transformation in the Public Sector at the Graduate School of the Norbert Wiener University. He is a Government Innovation Leader and Open Data Project Manager at Tellmenets, a Hispano-American consultancy agency in digital government. He has an MSc in Public Sector Innovation and e-Governance from KU Leuven (Belgium), WWU Münster (Germany), and Taltech (Estonia). He also has a BA in Communication for Development from PUCP (Peru).

Chiara Garau is an Associate Professor in Urban and Regional Planning at the DICAAR of the University of Cagliari, Italy. She was the Principal investigator of several international projects, among which Governing the smart city: a governance-centered approach to smart urbanism "GHOST" (2015–2019) supported by the MIUR (Italian Ministry of Education, Universities, and Research) and financed by the SIR (Scientific Independence of Young Researchers) program (total amount founded: 398,511 euros). Her main research interests are focused on issues on smart cities, participatory processes, cultural heritage, urban governance, and urban policies.

Angela Graf, Dr. Phil. Habil., is the Principal Investigator and Project Leader of an interdisciplinary research project on the Digital Transformation of Engineering Companies at the Bavarian Research Institute for Digital Transformation (BIDT). Moreover, she is also a Senior Lecturer at the TUM School of Social Sciences and Technology, Technical University of Munich (Habilitation in Sociology). She holds a PhD and Diploma in Sociology from the Technical University of Darmstadt, Germany. Her research focus is on digital transformation, power structures, collective identity, and professions. She published numerous articles on organizational, structural, and institutional transformation in academia, higher education, and economy. Her work has appeared in national and international journals (e.g., *Higher Education*, *Journal for Discourse Studies, Communication and Language at Work*, *Leviathan*).

Thomas Hess is a Professor of Information Systems and Management at the Ludwig-Maximilians-Universität München (LMU), LMU School of Management, where he also serves as Director of the Institute for Digital Management and New Media. He is also the Director of the Bavarian Research Institute for the Digital Transformation (BIDT). Thomas holds a PhD from the University of

St. Gallen, Switzerland, and a Diploma in Business Informatics from the Technical University of Darmstadt, Germany. His research focuses on the potential of digital technologies for changes in value creation and in the management systems of companies. His work has appeared in numerous international journals (e.g., *Journal of Management Information Systems*, *European Journal of Information Systems*, or *Information Systems Journal*) and proceedings of conferences (e.g., *International Conference on Information Systems*, *European Conference on Information Systems*, and *Americas Conference on Information Systems*). His work has, according to Google Scholar, already been cited more than 19,000 times.

Abdulrahman Housawi is a practicing Nephrologist and Transplant Physician at King Fahad Specialist Hospital, Dammam (KFSH-D), the Director of Privatization Affairs at the Ministry of Health, and the Chief Officer for Planning and Organizational Excellence at the Saudi Commission for Health Specialties. He joined the Umm Al-Qura University in 2006 as an Assistant Professor in the Department of Medicine. In 2008, he joined KFSH-D, where he participated in the establishing team of the Multi-Organ Transplant Center (MOTC). He was the Founding Chairman of the Kidney/Pancreas Transplant (KPTx) Department. In addition, he led a project for establishing the MOTC Registry and MOTC Information System at KFSH-D. He was the Director of the Academic Affairs Administration (2008–2013) and the Director of the Training Administration (2013–2014). He was a member of KFSH-D's Center for Health Research's establishing team and its Research Steering Committee (2009–2015). Currently, he is responsible for the development and implementation of the Saudi Commission's strategy, including its transformation to a data-driven organization (2016–present).

Andrej Kos, PhD, is a Professor at the Faculty of Electrical Engineering, University of Ljubljana, Slovenia, and Head of Laboratory for Telecommunications. His research work focuses on loT digitalization, broadband networks (in rural areas), and the use of distributed ledger technologies in industry. He is the Head of Innovation Commission at the University of Ljubljana.

Sergei Kozhevnikov, Mgr., MSc., graduated the Samara State Airspace University in 2009 in the field of information technologies in the airspace industry and a second master's degree in airplane and rocket construction. In 2012 completed the Ph.D. program in System analysis. Has 12 years' experience as a developer, business analyst, and project manager in IT companies as well as a senior scientist at Samara State Technical University and research scientist at Czech Technical University in Prague. Since 2019, he is a doctoral student at Czech Technical University in Prague, Faculty of Transportation Sciences in the Smart City study program.

Has experience in the development and upgrading of IT systems implemented in production all over the world. His key focus in R&D is developing ontologies and multi-agent based tools for collective decision-making for supporting selforganization in complex adaptive systems and solving highly complex problems of resource allocation, scheduling, and optimization.

His research focuses on the Theory of Complex Adaptive Systems, Smart Cities, Multi-Agent Systems and Technology, Emergent Intelligence, Self-Organization,

Ontologies and Knowledge Bases, Real-Time Resource Scheduling and Optimization. He is the author or co-author of more than 30 scientific papers and 10 patents.

Miltiadis D. Lytras is a Visiting Researcher at Effat University. He is a world-class expert in the fields of cognitive computing, information systems, technology-enabled innovation, social networks, computers in human behavior, and knowledge management. He is an Expert in Advanced Computer Science and Management, Editor, Lecturer, and Research Consultant, with extensive experience in academia and the business sector in Europe and Asia. He is the Editor-in-Chief of *International Journal in Semantic Web and Information Systems*. He has co-edited more than 110 high impact factor special issues in ISI/Scopus indexed journals and co-edited/authored more than 80 books in international publishers including Elsevier, Emerald, IGI-Global, Springer, etc.

Andréia de Bem Machado holds a PhD in Engineering and Knowledge Management. Professor at the Federal Institute of Santa Catarina and a postdoctoral student at the Federal University of Santa Catarina. She is at the National Institute of Educational Studies and Research Anísio Teixeira (Ministry of Education of Brazil). She has been working in the educational field for over 25 years. Currently, his research interests are public policy and political science, innovation, and business management issues: Innovation, Education, digital transformation, management, hybrid education, digital technologies, active methodology, knowledge media, entrepreneurship, and knowledge management. She is the Author of numerous articles and book chapters published in national and international journals.

Francesca Mighela graduated in Electronic Engineering (2002), with a PhD in Electronic and Information Engineering (2006). She started work at Space S.p.A. in 2014, as a researcher on the application of ICT and IoT technologies to Cultural Heritage and Cultural Tourism. Since 2015, she is a Project Manager for research projects, both Italian and European projects. The main activities are to write projects, develop projects, coordinate partners and human resources, and manage projects to reach project goals. Main research areas include the application of new ICT technologies, like artificial intelligence, cloud computing, data analytics, and AR/VR to cultural heritage.

Lea Müller, MA, is a PhD candidate at the Technical University of Munich, TUM School of Social Sciences and Technology. She is also part of an interdisciplinary research project at the Bavarian Research Institute for Digital Transformation (BIDT), investigating engineering companies' digital transformation. She holds a Master's degree in Sociology from the Technical University of Dresden, Germany, and a Bachelor's degree in Sociology and Media Studies from the Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Germany. Previously, she held a management position at a large digital services and technology company. Her research focus is on management and leadership in digital transformation processes.

Anastasija Nikiforova is an Assistant Professor of Information Systems at the University of Tartu (Faculty of Science and Technology, Institute of Computer Science, Chair of Software Engineering), and a part of European Open Science Cloud Task Force "FAIR Metrics and Data Quality." Her research interests include, but are not limited to, data management with a particular focus on data quality, open government data, Smart City, Society 5.0, sustainable development, IoT, HCI, and digitization. She is an expert of the COST – European Cooperation in Science & Technology, Latvian Council of Sciences in (1) Natural Sciences – Computer Science and Informatics, (2) Engineering and Technology – Electrical Engineering, Electronics, Information and Communication Technologies, and (3) Social Sciences – Economics and Business, as well as an associate member of the Latvian Open Technology Association. She serves in the program committee for 20+ international conferences, as invited reviewer for 15+ high-quality journals, as well as an Editorial Board Member for several journals.

Anna Onesti, Archaeological Park of Pompeii (Naples, Italy), is Architect and PhD in "Methods of Assessment for the Integrated Conservation, Recovery, Maintenance and Management of the Architectural, Urban and Environmental Heritage." She is Head of the Cultural Heritage Protection Area of the Archaeological Park of Pompeii and of the Office for the Protection of Architectural and Landscape Heritage. She is also Scientific Tutor for the Work-based Learning Activities. In her research activities, the issues of recovery and restoration of cultural heritage are combined with the issues of the economy of culture, with a view to designing scenarios of sustainable development from local actions focused on heritage conservation. Her research is part of the framework of studies aimed at operationalizing the UNESCO approach of the Historic Urban Landscape (2011). She is Member of ICOMOS Italia (International Council On Monuments and Sites) from 2016.

Szymon Ossowski, Vice-Dean in Faculty of Political Science and Journalism, graduated in Political Science from Adam Mickiewicz University in Poznań, Poland, combining two specializations: local government and political marketing. He is the Author of two monographs: Political Ethics of Liberal Democracy (Poznań, 2008); Towards Market Economy. Threats to Liberal Democracy in Poland (Poznań, 2011), and a Co-author of Tabloidization of Political Discourse in the Polish Media (Poznań 2013), written with Dorota Piontek and Bartosz Hordecki. His research interests are focused on the axiology of politics, theory and functioning of liberal democracy, studies into journalism, public relations, and political and social marketing.

Regina Negri Pagani obtained PhD in Production Engineering (Federal University of Technology Paraná – UTFPR and Université de Technologie de Compiègne – Sourbonne Universités), Masters in Industrial Engineering (UTFPR), Specialist in Industrial Management (UTFPR), and Bachelor in Business Administration (Maringá State University – UEM). She was a Visiting Professor at the State University of Ponta Grossa (UEPG) and at the Université de Technologie de Troyes (UTT), France, and Head of the Academic Department of Production Engineering. Currently, she is Adjunct Professor for Undergraduate, Master's

and Doctoral programs in Production Engineering (UTFPR), Researcher Productivity PQ2 (CAPES, Brazil), Associate Editor at the International Journal on Semantic *Web and Information Systems* (IJSWIS), and Mentor in the EURAXESS Mentoring Program. She has teaching experience in General Theory of Administration, Entrepreneurship, International Marketing, Strategic Planning, Third Sector Management and Social Responsibility, Organizational Behavior, Human Resources, Career Management, and Knowledge and Technology Transfer. She is the Researcher Leader of the group Management of Technology Transfer. Her research interests are technology transfer, smart cities, and sustainable development.

Laura-Diana Radu is a PhD Hab. Associated Professor at the Department of Accounting, Business Information Systems and Statistics, Faculty of Economics and Business Administration, Alexandru Ioan Cuza University of Iasi. The main fields of research are smart cities development, accounting information systems, agile project management, and green and sustainable information systems. Research outcomes: 12 books and chapters as author/co-author, 14 international or national projects, 68 articles and studies published in the country and abroad, over 30 conferences worldwide (in Portugal, Spain, Italy, Turkey, Czech Republic, etc.). She currently teaches Accounting Information Systems, Agile Project Management, Software for Project Management, and Information Systems Analysis, at Alexandru Ioan Cuza University of Iasi.

Darina Rojíková is a Doctoral candidate at the Faculty of Economics in Public Economics and Policy. Her dissertation thesis and research activities are oriented toward branding of cities, marketing communication of the territory, competitive advantage of cities, and strategic marketing planning.

Clayton Pereira De Sá is a PhD student in Production Engineering at the Federal University of Technology, Paraná (UTFPR), with a Masters in Intellectual Property and Technology Transfer for Innovation (Midwestern State University – UNICENTRO), Expert in People Management, and Bachelor in Business Administration from (UNICENTRO). He is currently a Professor at the Federal Institute of Paraná and Member of the Research Group Technology Transfer Management and Smart Cities. His research interests are technologies, smart cities, sustainable development, artificial intelligence, and technology transfer.

Fabiane Florêncio De Souza is a PhD student in Production Engineering and at the Postgraduate Program in Production Engineering at Federal University of Technology, Paraná (UTFPR, Brazil) with a scholarship from Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES). She has a Masters' degree with applied field research at Renault Group in the area of Big Data applied to Quality Management 4.0. She is a Member of the Research Group Management of Technology Transfer and Smart Cities. Her research interests are big data analytics, quality management, smart cities, and technology transfer.

João Rodrigues dos Santos holds a PhD in Economics and Management, a Master's degree (with research in the area of Territorial Planning), and a degree in Geography and Territorial Management (Universidade Nova de Lisboa). He is a Professor at the European University/IADE and he collaborates with the Portuguese Catholic University's Center for Studies and Surveys. His research interests currently are Economics, Political Economy, Political Economy of Communication, Public Policy, Territorial Planning, Environmental Sustainability, Innovation, Information Technology, and Communication. He is the Author of several articles and book chapters published in national and international journals. He is also the Author of two books in the areas of Economics and Territorial Management, respectively. Currently, he chairs the Parish Council of Vila Franca de Xira (Lisbon Metropolitan Area).

António Sacavém is an Assistant Professor at Universidade Europeia and IPAM and an Invited Professor at Católica Lisbon School of Business and Economics. He holds a PhD in Management with a dissertation on leadership and communication, a Master's degree in organizational behavior, and an executive MBA. He also attended several executive programs (e.g., Leadership & Organisational Transformation at London Business School; Executive Education – IHRSA-U at IESE Business School). He provides consultancy, mentoring, and coaching on change management processes, inclusion and diversity, organizational development, strategic reflections, leadership & team management, and business negotiations. He is the Author and Co-author of several national and international publications. His current research interests are leadership, entrepreneurship, communication, non-verbal communication, innovation, management, and digital transformation. His work has been shared on several television channels including SIC, RTP1, TVI, and TVI24.

Rudy Setyobudi is Vice President of Smart Meter and Energy Settlement at PLN, Indonesia. He received his BEng degree in Electrical Engineering from Sepuluh Nopember Institute of Technology, Indonesia in 1992, and MSc degree in Electrical Power System from Gadjah Mada University, Indonesia in 2006. He has worked in electricity distribution, retail transaction, and customer service for more than 25 years, around Indonesia area. He is currently involved in a number of development activities in the energy metering and digital billing system in Indonesia.

Maria José Sousa (PhD in Management) is a University Professor and a Research Fellow at ISCTE/IUL and CIEO (Algarve University). Her research interests currently are public policies and political science, innovation, and business management issues. She is a Best-seller Author in ICT and People Management and has Co-authored over 70 articles and book chapters and published in several scientific journals (e.g., *Journal of Business Research*, *UAIS*, *Future Generations Computer Systems*, *Journal of Medical Systems*, *I. J. of Knowledge*, *Culture and Change Management*, *Knowledge Management*, *Wseas Transactions on Business and Economics*, *Information Systems Frontiers and others*), she has

organized and peer-reviewed international conferences. She is also an External Expert of the COST Association – European Cooperation in Science and Technology.

Simona Stojanova is PhD candidate at the Faculty of Electrical Engineering, University of Ljubljana (UL), Slovenia. She is a Researcher at the Laboratory for Telecommunications, Faculty of Electrical Engineering, UL. Her research work focuses on sustainable community development through digitalization.

Miroslav Svitek, prof., Dr, received the Ph.D. degree in radioelectronic at Faculty of Electrical Engineering, Czech Technical University in Prague. Parallel to his studies at university he attended the Prague Conservatory and graduated in the art of playing the accordion. Since 2008, he has been Full professor in engineering informatics at Faculty of Transportation Sciences, Czech Technical University in Prague. In 2010 – 2018 he was Dean of Faculty of Transportation Sciences, Czech Technical University in Prague. Since 2018, he has been Visiting professor in smart cities at University of Texas at El Paso, USA. Since 2005, he has been nominated as the extraordinary professor in applied informatics at Faculty of Natural Sciences, University of Matej Bel in Banska Bystrica, Slovak Republic.

The focus of his research includes complex system sciences and their practical applications to Co-operative Intelligent Transport Systems (C-ITS), Mobility as a Service (MaaS), Smart Cities and Smart Regions. His scientific approach is based on the principles of Industry 4.0 connected with new approaches to resiliency and sustainability taking into account environmental, social and governance (ESG) indicators. This problem can be considered as a complex adaptive network-centric "system of systems" with a number of interconnections. The multi-agent technologies (MAT) can help to use the phenomenon of "Swarm Intelligence".

Jiri Tencar, Ing., Dr., graduated in Structural Engineering and Architecture from Czech Technical University in Prague, in 2002. In 2009, he received the Ph.D. degree in Sustainable Development and Industrial Heritage from the Czech Technical University. He was a visiting Research Scholar at the University of Cambridge, Department of Architecture. Jiri is the guarantor for buildings and energetics in the Smart City Pisek Coordinator Office. External teacher at the Faculty of Civil Engineering at the Czech Technical University in Prague (CTU) and a researcher at University Centre of Energy Efficient Buildings at CTU. Founder and CEO of ECOTEN (Smart Energy Solutions) s.r.o., energy consultancy and design company focusing on Sustainable Architecture and ECOTEN urban comfort s.r.o., an urban environmental consultancy focused on the climate adaptation of cities. Passionate about sustainable, smart and green building, architecture, energy efficiency and optimization, resilience strategies and adaptation towards climate change by means of smart cities. He is the author or co-author of several scientific papers and two books.

Anna Vaňová is a Full Professor at the Department of Public Economics and Regional Development. Her scientific and pedagogical activity is focused on the

study of trends in place development, especially in creative and smart cities and regions, place marketing, and place branding. She is the Author or Co-author of more than 130 scientific articles, monographs, chapters, and studies. She has been a Principal Investigator or Member of Project Teams of 49 national and 14 international projects. She is the main National Representative of the Slovak Republic in the Presidency of the International Association for Public and Non-Profit Marketing (IAPNM). She is a Member of the Editorial Boards of several foreign scientific journals.

Jure Verhovnik is PhD candidate at the Faculty of Electrical Engineering, University of Ljubljana (UL), Slovenia. He is a Researcher at the Laboratory for Telecommunications, Faculty of Electrical Engineering, UL. His research work focuses on digitalization of small and medium size companies, digital transformation, and Industry 4.0.

Katarina Vitálišová is an Associate Professor in the Department of Public Economics and Regional Development at the Faculty of Economics. She orients her researcher on the issue of public and local governance, building and maintaining relationships, and partnerships between stakeholders, strategic planning of the spatial development, and implementation of new approaches in it. She is the Author and Co-author of more than 120 scientific papers (domestic, foreign, scientific monographs, articles in impact, and CC journals), published and presented mainly abroad (e.g., in Brussels, London, Rome, Malta, Porto, Bordeaux, and Warsaw). She actively develops cooperation with practice and has extensive experience in solving of domestic and foreign research projects.

Ana Iolanda Voda is a PhD Lecturer at the Department of Management, Marketing, and Business Administration, Faculty of Economics and Business Administration, Alexandru Ioan Cuza University of Iași, Romania, with specific expertise on institutions and sustainable growth, entrepreneurship, and smart cities. She attended over 50 conferences worldwide (in Portugal, Spain, Czech Republic, etc.), published over 25 papers indexed in WOS and over 10 books/books chapters. She acquired expertise in Project Management as Project Director or Manager of various national or international projects: Promoting Innovation and Entrepreneurship Through Institutional Reform; an Empirical and Sectorial Approach (2017–2019); European Smart Cities for Sustainable Development (SmartEU) (2020–2023).

Fabian Zimmer, MA, is a PhD candidate at the Ludwig-Maximilians-Universität München (LMU) and part of an interdisciplinary research project at the Bavarian Research Institute for Digital Transformation (BIDT). He holds a Master's degree in Business Studies from the LMU. His research focus is on digital transformation in the automotive sector and path dependencies in the course of digital transformation.

This page intentionally left blank

Preface

Smart Cities and Digital Transformation: Empowering Communities, Limitless Innovation and Sustainable Development is a Smart Cities Handbook putting together on a single volume a three-tier approach to smart cities: Limitless Innovation, Sustainable Development and Empowering Communities. The active learning approach that is adopted helps the reader to exploit comprehensive social sciences and computer science knowledge into real-world problems, building critical thinking skills and competencies. The exploratory journey to the Smart Cities and Digital Transformation research domain compensates the reader with a significant enhancement of intellectual skills and problem-solving capability.

The book is about putting together the diverse communities of researchers, academics, practitioners, industrial managers, and policy-makers to promote progressive applied research, best practices and lessons learnt related to the phenomenon of smart cities, digital transformation and sustainable development.

A unique characteristic of the book is that has a social sciences' core component aiming to discuss and cover the soft issues of Smart Cities and Digital Transformation research. Thus, topics related to the knowledge, soft skills, communication, ethical issues, participation, and motivation are important in our discussion. In parallel, the quest of limitless innovation and sustainable development is another key dimension of our publishing strategy. The exploitation of computer science and information systems research with a key emphasis on emerging technologies such as Artificial Intelligence, Internet of Things, Cloud Computing, Edge Computing, Open sources Platforms, Virtual Reality, etc., will bring to the reader unique value related to the new generation of transparent technologies aiming to improve the well-being, the quality of life in modern cities.

This book also targets diverse communities:

- Social scientists and researchers aiming to understand the social dynamics of socio-technical platforms and systems within modern smart cities, toward promoting value-based services, models, and frameworks.
- Computer Scientists, Information Systems Specialists, Data Scientists, aiming to contribute sophisticated algorithms, applications, and services toward an integrated ecosystem of Smart Cities Platform.
- Policy Makers and Digital Transformation experts, aiming to set the foundations and the value-based strategies for the next generation Smart Cities research with an emphasis on innovation and the promotion of sustainable development goals with a unified approach.

- Students from social sciences, computer science and information systems areas that are willing to get up-to-data, knowledge, know-how and expertise on the Smart Cities phenomenon.
- Industry stakeholders that are interested in exploiting new ideas for start-up companies and technology-driven innovation for value-based modern smart cities' services.
- Government officers that need to understand the latest developments on a fast-changing new scientific domain with significant applied dimensions and impact in the new forms of government and citizens' participation toward bold responses to critical social challenges.

Overall the book serves a diverse ecosystem of scientists, practitioners, business people, innovators, investors, government officers that jointly mobilize a new form of economy directly linked to the developments, impact and value of Smart Cities and Digital Transformation context.

The edited volume has the following features and benefits:

- *Value-based approach*: The overall discussion of the complementary aspects of Smart Cities and Digital Transformation research are organized around a strategic framework that integrated Limitless Innovation, Sustainable Growth/Development and Empowerment of Communities. This allows readers to benefit from the strategic alignment of each layer to a value-based framework.
- *Integration of Research/Academia/Industry*: The overall publication strategy aims to bring together the diverse communities with a developmental focus. The scientific knowledge and the industry services are integrated with significant social sciences research in order to provide an end-to-end understanding for the value components of any real-world smart city application and service.
- *Social Impact and Value*: The edition, promotes the debate for the social impact and the value of socio-technical smart cities platforms. Also, the discussion of Digital Transformation is delivered through the lenses of social participation and transformation.
- *Timely Knowledge Dissemination*: The agenda and the covered topics deliver the most recent knowledge and best practices related to the phenomenon of Smart Cities and Digital Transformation serving diverse communities that need timely, trusted and applied knowledge.

The main problem the book addresses is the unification and integration of the diverse communities of stakeholders in the Smart Cities and Digital Transformation area. Below we summarize the key problem solution structure of our book:

- *Untrusted Content* – Timely trusted knowledge. In an era where the debate on Smart Cities is full of inconsistencies and untrusted contributions our edition delivers timely content from trusted sources that represent the most influential stakeholders in the contexts.
- *Monolithic Approach* – Active learning and engagement. In an era where readers have access to thousands of sources of information and textbooks or

academic editions deploy the monolithic static approach, in our book all the chapters and contributions are accompanied with interactive active learning components, aiming to improve the learning/knowledge acquisition experience.
- *Myopic Views/Integrated Approach* – In the debate of smart cities, most of the approached deploy monolithic views of a single community, for example, computer scientists or social scientists. In our approach, we develop the context for synergetic understanding and contribution among diverse communities.
- *Lack of Strategy/Well-defined Strategy* – In most book series, the published volumes have no sequence and no integration. In our book, we have a well-defined publication strategy and almost three more volumes are ready in terms of contributors and publication priorities as they are aligned to the overall strategy.

The book is organized in 15 chapters with excellent contributors and top quality scholars. We are obliged to their intellectual work and to their contribution.

Below is a summary of the abstracts of the chapters.

Chapter 1: Future Smart Cities Research: Identifying the Next Generation Challenges

Miltiadis D. Lytras

The recent debate on smart cities research is challenged by the arrival of brand-new technologies and new ideas on their social impact. Beyond the hype and the expectations, the next generation smart cities research has to be grounded on the lessons learnt and the experience of the current extensive implementations of smart cities projects worldwide. Additionally, it is required to revisit the basic assumptions for the added value of smart cities research to the strategic blueprints around the world. This chapter is aiming to communicate a new agenda for future smart cities research including social, economic, technological, and community factors. The main contribution is organized around a framework that intends to integrate the technology sophistication, the human and social dynamics, and the strategy orientation of smart cities.

Chapter 2: Accelerating the Digital Transformation of Smart Cities in Covid-19 Pandemic Context

Laura-Diana Radu and Ana Iolanda Vodă

The recent pandemic of Covid-19 has substantially changed people's daily lives. They work and interact even more based on information and communication technologies (ICT). The use of new technologies and the interconnectivity specific to smart cities have intensified in the context of the pandemic. A significant part of the population works from home, participates in concerts and other remote social activities, organizes online parties, communicates virtually with friends and family, etc. These transformations required an extended and more stable

infrastructure, significant investments in the development of software applications dedicated to remote activities (streaming, contact tracing, security, online ordering and delivery, telemedicine, etc.), in specific services (data storage and applications, electronic signature services, etc.) and the integration of subsystems used in smart cities. This chapter examines the role of SARS-CoV-2 pandemic in the acceleration of digital transformations in smart cities due to the need and desire to digitize communities and public administrations. It has become a top priority for both private and public companies from smart cities in the context created by the pandemic.

Chapter 3: Smart City 5.0 as Digital Ecosystem of Smart Services. Basic Concept

Miroslav Svitek and Sergei Kozhevnikov

Cities evolved into quite complex urban systems. The rigid management process must reflect the complexity of the current political, social, and economic environment. With the vast city growth, citizens experience new difficulties – traffic congestion, pollution, immigration, overcrowding, and inadequate services.

In our research, we analyze problems and benefits that occur with the growing complexity and offer a new concept considering every city as a live and constantly developing complex adaptive system of many participants and actors that operate in an uncertain environment. These actors (residents, businesses, transport, energy, water supply providers, entertainment, and others) are the main elements of city life.

The new concept of "Smart City 5.0" is based on a previously developed model of Smart City 4.0 (compared with Industry 4.0) and implements the Urban Digital Ecosystem, where every element can be represented by a smart agent operating on its behalf. It is shown that smart services can interact vertically and horizontally in the proposed ecosystem, supporting competition and cooperation behavior based on specialized network protocols for balancing the conflicting interests of different city actors.

The chapter describes the design principles and the general architecture of the Urban Digital Ecosystem, including the basic agent of smart service, protocols of the agent's negotiation, the architecture, and basic principles Smart City knowledge base.

The developed evolutionary methodology of implementation will ensure a minimum of disruptions to city services during its transformation into an urban ecosystem to harmoniously balance all spheres of life and the contradictory interests of different city actors.

Chapter 4: Digital Transformation: Management of Smart Cities

Andreia De Bem Machado, João Rodrigues Dos Santos, António Sacavém, and Maria Jose Sousa

Cities are becoming smarter and more optimized because of digital transformation, reducing costs, increasing safety, attracting investment, ensuring sustainability, and increasing viability. As a result of this optimization, they are becoming smart cities. Smart cities use the Internet of Things' devices, such as connected sensors, lights, and smart meters, to improve infrastructure and design by gathering and analyzing real-time citizen data. In this research, different conceptions of smart cities and their interconnections with digital transformation are presented. Therefore, the purpose of this chapter is to analyze how digital transformation may help manage smart cities. As a result, a thorough and integrated evaluation of the SCOPUS database will be conducted in order to address the following questions: (1) What are smart cities? (2) What is digital transformation? (3) How does digital transformation help to manage smart cities? The results point out that technologies and digital abundance, which include artificial intelligence, blockchain, and Internet of Things, play a crucial role in managing a controlled and automated infrastructure in smart cities. These favor the development of suitable places to live, work, and have fun, with a better quality of life for everyone.

Chapter 5: Smart Citizen in Smart City

Weronika Dopierała-Kalińska and Szymon Ossowski

This article discusses issues related to the use of new technologies in local communication on the example of selected Polish cities. It will discuss the tools used by local authorities in the process of local communication with residents and entrepreneurs, aimed at increasing their participation in the local decision-making process. The study will focus on tools for empowering residents and increasing civic participation in cities. Based on an analysis of documents, interviews with representatives of city authorities (officials, councilors) and residents, using the IDI method, an attempt will be made to analyze the effectiveness of particular tools used by officials. On this basis, the authors formulate conclusions and recommendations for the future on the selection of the most effective tools used in local communication with residents. The aim of this paper is not only to diagnose the current use of the smart city concept in Poland, but also to create a forecast of its use in the coming years.

Chapter 6: Mobility and Health in the Smart City 3.0: Trends and Innovations in Italian Context

Chiara Garau, Giulia Desogus, Alfonso Annunziata, and Francesca Mighela

The smart city paradigm has evolved from a perspective focused on technological infrastructures to an approach in which the effects of the technological apparatus improve the quality of life of people, urban resilience, urban sustainability, and health, by introducing the concept of smart and sustainable city 3.0. In this chapter, the authors evaluate mobility as a key aspect of improving the environmental, social, and economic well-being of communities under the central concept of smart and sustainable city 3.0. To this end, the authors underline the

link between mobility, the Sustainable Urban Mobility Plans (SUMP), and environmental health. Then, the authors outline (i) the mobility requirements to be met from a smart perspective on environmental health and how (ii) the SUMPs can be considered as the basic tool for connecting smartness with mobility and environmental health. Finally, the results obtained will be discussed, and future directions of this research will be illustrated.

Chapter 7: Future Mobility – Digital Transformation of Automotive Companies as a Question of Organizational Identity

Angela Graf, Thomas Hess, Lea Müller, and Fabian Zimmer

Talking about smart cities also entails talking about new ways of mobility. Various concepts compete for reimagining future mobility, most prominently connected cars, robo taxis, and other forms of shared mobility. New digital technologies, changing customer requirements, but also new competitors are dynamically affecting previous market logics. To stay future-proof in this new world of mobility, the automotive sector, which is an important nucleus for developing such mobility solutions, is currently undergoing fundamental digital transformation processes. Established car manufacturers have to find their path to choose out of the many possibilities on the rise. Against this backdrop, they face the major challenge to find an answer to the question: Who are we and who do we want to be in the future? Therefore, we argue that organizations' digital transformation is highly entangled with questions on organizational identity and discuss digital transformation as a potential identity threat for established organizations.

We begin this chapter by introducing the concept of organizational identity. Afterward, we continue with applying it to the practical context of car manufacturers: After depicting the major trends of digitalization in the mobility and automotive sector, we will focus on the digital transformation processes of established automotive companies and discuss their impact on organizational identity. Empirical illustrations of the Volkswagen case depict our theoretical considerations.

We provide theoretical ideas for better understanding the impact of digital transformation on organizational identity, as well as suggestions for practitioners concerned with organizations' digital transformation processes.

Chapter 8: Digital Transformation of City Branding: Comparison of the Role of Digital Communication in Branding of Selected Cities in Europe and Slovakia

Darina Rojíková, Kamila Borseková, Katarína Vitálišová, and Anna Vaňová

The present chapter aims to assess how digital transformation impacts current trends in city branding, to analyze the role of digital communication in the branding of selected cities, and to compare the level of exploitation of digital

communication for city branding between European and Slovak cities. We conducted empirical research in several phases, and the overall sample consists of 155 cities in Europe and Slovakia. The results of our research showed that European and Slovak cities use to some extent all the investigated tools of digital marketing communication in city branding with a dominant position of social media, both in terms of exploitation and importance for city branding in European and Slovak cities. European cities score significantly better than Slovak cities in all elements of the City Brand Hexagon, as well as in the overall city brand index. Therefore, city branding strategies in the best European cities can serve as a good practice example or inspiration for Slovak cities. Cities with lower rankings and scores on city branding should focus on strengthening their city branding or strengthening their digital communication. The possible trajectory is also the concerted strategy for the branding of the city and its digital communication.

Chapter 9: Designing Policy for Smart Cities

Marianna Cavada

This position chapter explains the importance of designing policies for smart cities. This chapter aims to provoke discussions that will allow further understanding of the smart cities policy agenda. It is inevitable for various smart cities actors to agree on ways to implement change in smartness. This is because of the different views on developing smart cities (or smart cities initiatives) that will ensure shared benefits for everyone. To achieve a wider understanding of how this might be achieved, the chapter raises the points of designing policy for smartness and the influence of governance on policy design. It explains what we mean by policy and governance and the link between them. Overall, the policy needs to be supported by a governance system, which is widely accepted – for example for truly smart cities, a governance system needs to evaluate the benefits through livability; these are the environmental, societal, governance, and economic lenses. A liveability approach to the governance system can promote open and democratic processes to smartness.

Chapter 10: The Role of Commons in Smart Sustainable Development: A Hybrid Approach for the Recovery of Settlement Systems

Martina Bosone and Anna Onesti

The research is based on the analysis of recent experiences of participative processes in the reuse and maintenance of contexts considered as "urban waste," focusing their role in smart sustainable development processes. The recognition of discarded urban spaces/buildings as regeneration opportunities opens up new perspectives on the communities' commitments and responsibilities, in new governance models. These experiences, better known as "commons," highlight the active role of communities in establishing new unconventional forms

of value creation and production based on circular processes and interdependences between city and communities. Circularization and synergies are the fundamental precondition for smart sustainable development. Assuming the Historic Urban Landscape approach as general framework, the phenomenon of commons represents an opportunity to make it operational through an integrated methodology based on the recovery of the environment built according to an inclusive and hybrid approach, configured by culture and shared with local communities. In this perspective, this contribution proposes an evaluation framework not only to monitor the results and impacts produced by these experiences, but also to stimulate and improve awareness, self-learning and self-evaluation processes of the actors involved in regeneration processes toward a smart sustainable development.

Chapter 11: The Role of Open Data in the Transformation to Society 5.0: A Resource or a Tool for SDG-Compliant Smart Living?

Anastasija Nikiforova, Miguel Angel Alor Flores, and Miltiadis D. Lytras

Open data are characterized by a number of economic, technological, innovative, and social benefits. They are seen as a significant contributor to the city's transformation into Smart City. This is all the more so when the society is on the border of Society 5.0, that is, shift from the information society to a super smart society or society of imagination takes place. However, the question constantly asked by open data experts is, what are the key factors to be met and satisfied in order to achieve promised benefits? The current trend of openness suggests that the principle of openness should be followed not only by data but also research, education, software, standard, hardware, etc., it should become a philosophy to be followed at different levels, in different domains. This should ensure greater transparency, eliminating inequalities, promoting, and achieving sustainable development goals. Therefore, many agendas now have openness as a prerequisite. This chapter deals with concepts of open (government) data and Society 5.0 pointing to their common objectives, providing some success stories of open data use in smart cities or transformation of cities toward smart cities, mapping them to the features of the Society 5.0. We believe that this trend develops a new form of society, which we refer to as "open data-driven society." It forms a bridge from Society 4.0 to Society 5.0. This chapter attempts to identify the role of openness in promoting human-centric Smart Society, Smart City, and Smart Living.

Chapter 12: AI and Employability: Challenges and Solutions from This Technology Transfer

Regina Negri Pagani, Clayton Pereira De Sá, Alana Corsi, and Fabiane Florêncio De Souza

Smart scenarios related to industries or cities, characterized by intensive technology transfer and use of innovative and disruptive technologies, have been in

the spotlight either on academic or organizational discussions, especially those with a technocentric focus. Among these technologies, artificial intelligence (AI) emerges as one of the most challenging one due to its complexity. Therefore, this chapter aims to address AI in particular the future of the labor market, exploring the challenges regarding the skills required in the context of AI technology, addressing its uses, challenges, and benefits. To achieve this goal, a systematic review was conducted on the extant literature using the methodology Methodi Ordinatio. The results show that the current literature is gradually changing from a more critical and negative view of AI to a more optimistic one, with more positive approaches and expectations regarding its benefits. As practical implications, the findings can be used as a guide for governments to develop strategies aiming to deal with upcoming challenges, especially regarding future jobs and employability.

Chapter 13: The Use of IOT Technology and Big Data in Smart Cities: Examples from Slovenia

Simona Stojanova, Jure Verhovnik, Andrej Kos, and Emilija Stojmenova Duh

With the ever-growing population in the urban areas, the concept of smart cities started to be more present in the literature. Smart cities are seen as a solution that will respond to the needs of providing a sustainable place for living, and at the same time improving residents' lives. To achieve this, various information and communication technologies (ICTs) are exploited, making the digitalization in the modern world of an immense importance. Advanced digital technologies enable the transformation of existing and the creation of new business models, the development of new products and services, increase the efficiency and competitiveness of the economy, and contribute to wider socio-economic development. Digitization of society and the economy through innovative and intensive use of ICTs has great potential for growth and is the basis for further development and competitiveness. This all generates an enormous amounts of data sets from which useful information are generated and used again the decision support systems. This chapter presents two examples from Slovenia where big data is used for improving residents' lives, as part of the strategies for smart cities.

Chapter 14: Cost–Benefit Analysis of Advanced Metering Infrastructure Implementation for Strengthening Smart City in Indonesia

Zainal Arifin, Rudy Setyobudi, and Kartika Asri Elnur

On its way to develop a smart grid in Indonesia, one key enabler in the early stage of implementation is advanced metering infrastructure (AMI). Thus, PLN as the only electricity utility company servicing customers from upstream to downstream in Indonesia, has started AMI program at some main cities. With AMI, real-time energy consumption profile, energy meter status and condition, and customer power quality can be acquired. Subsequently, these data collected

by AMI can be used for further smart grid implementation by such IT systems and big data analysis. Instead of its function for smart grid backbone, AMI also significantly support smart energy on the city as a part of smart city initiatives. Nevertheless, its implementation requires more investment than the conventional metering system. This investment needs to be evaluated to define whether AMI is feasible and viable or not. This chapter is intended to observe the feasibility of AMI implementation in Indonesia using cost-benefit analysis. Two schemes were used as study objects, one scheme in which the communication infrastructure was managed by PLN itself, and the other one in which the communication infrastructure was managed by a third party. From the analysis, it appears that both schemes are proven to be feasible.

Chapter 15: Digital Transformation and Smart Cities: Insights from the Healthcare Domain

Miltiadis D. Lytras, Basim Alsaywid, and Abdulrahman Housawi

Digital transformation is one of the key concepts attached to the smart cities' domain. The requirement to enhance strategically the way that business is delivered around different areas is a critical milestone for the digital transformation agenda and also for business performance management. In this short position chapter, we are focusing on the area of healthcare and we are providing key insights and lessons learned from Saudi Arabia. The main contribution of the chapter is a structured discussion on a digital healthcare strategy in the context of smart cities.

Chapter 16: Smart City 5.0 as the Digital Ecosystem of Smart Services. Practical Applications

Miroslav Svitek, Sergei Kozhevnikov, Jiri Tencar, Sagnik Bhattacharjee, and Viktor Benes

Cities' population growth goes in hand with the development of new technologies that are becoming the key factor of the Smart City (SC) concept. It allows the implementation of efficient management solutions, operation, and sustainable development of a city to face the challenges of urbanization and improve the services for the citizens and visitors.

The concept of the SC 5.0 was first presented in Svítek, Skobelev, and Kozhevnikov (2020), where the problems of the complexity of current cities due to rigid management processes, variety of infrastructure, and SC modules, systems, subsystems, and applications were described.

To prove the concept, several practical examples were developed to cover the topics: modeling in SCs, practical implementation of multiagent technologies, the approach of creating city ontology and the city knowledge base as the instrument of semantic interoperability, and visualization possibilities of Smart Evropská as a SC Testbed used for teaching purposes.

The new organizational structure is proposed based on knowledge graphs, and practical examples are shown. The applicability of knowledge graphs to be used in combination with data management platforms for monitoring SC key performance indicators and providing interoperability of services are presented.

Smart Cities and Digital Transformation: Empowering Communities, Limitless Innovation and Sustainable Development is a collective, synergetic journey to knowledge exploration and scientific debate for a better world for all. We do owe this to the current and the next generations. We do hope that readers will value the hard work of all of us. We want to thank the great team of Emerald Publishing for their professionalism and the great work.

Acknowledgements

With heartfelt thank you to the exceptional colleagues, contributors of this volume for their intellectual work and their commitment to Smart Cities vision for a better world for all, with opportunities for the next generation.