

Public Administration and Information Technology

Volume 22

Series editor

Christopher G. Reddick, San Antonio, TX, USA

More information about this series at <http://www.springer.com/series/10796>

Leonidas G. Anthopoulos

Understanding Smart Cities: A Tool for Smart Government or an Industrial Trick?

Leonidas G. Anthopoulos
Project Management Department
Technological Educational Institute (TEI)
Larissa
Greece

ISSN 2512-1812 ISSN 2512-1839 (electronic)
Public Administration and Information Technology
ISBN 978-3-319-57014-3 ISBN 978-3-319-57015-0 (eBook)
DOI 10.1007/978-3-319-57015-0

Library of Congress Control Number: 2017937462

© Springer International Publishing AG 2017

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Printed on acid-free paper

This Springer imprint is published by Springer Nature
The registered company is Springer International Publishing AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Writing a book is really a hard and demanding process, which many times questions your patience and courage. Thankfully, I had my wife and kids supporting me during this discipline, who I missed for long and I would like to thank for their understanding and encouragement.

Foreword

This book gives an overview of smart cities and related activities. The book first reviews smart technologies, smart services and then visits a number of smart cities in practice, and then discusses how to govern smart cities to create a smart government. The book helps readers to understand smart cities and their future from various aspects.

From the 1990s to the 2000s, digital cities, the early stage of smart cities, had been developed and had become operational in Europe and Asia. At first glance, it seems natural to regard today's smart cities as the successor of digital cities. It is also natural to think that their differences are due to the technologies they use, i.e., digital cities are characterized by activities based on web services, while current smart cities demonstrate sensory services. This interpretation is not wrong but not so persuasive, because some of digital cities have been developed to connect virtual and real cities. For example, we started a digital city Kyoto in 1998 to make it real by establishing a strong connection to the physical Kyoto: The digital city complemented the corresponding physical city, and provided an information center for everyday life for actual urban communities. We thought "digital" and "physical" make things "real."

Let us submit two keywords "digital city" and "smart city" to Google Trends on trial. We learn that the smart city movement evolved ten years after the termination of digital city activities. In the meantime, global optimization of resource usage was attracting increasing attention around the world. Though there certainly are technological advances from digital to smart cities, it is more meaningful to see "digital city," the early stage of smart cities, as the exploration of cyber space, while the current "smart city" is the exploitation of physical space. The definitions and examples of smart cities are well investigated and summarized in this book that can trigger broad discussions on future cities.

One evolution of future cities, we may say, is the socialization of commerce. A typical example is Industrie 4.0 in Germany. The initiative aims at networking a large number of manufacturing companies to create a nation-wide supply chain. Large-scale factories in developing countries for mass production are no longer necessary. Instead, a network of many companies for mass customization will

appear regionally. Another evolution is the commercialization of society. Networking of unused resources in society can reveal profitable resources. A typical example is called the sharing economy. Since most cars in large cities are idled in parking lots, it is reasonable to share them to reduce environmental burden. We can expect the convergence of the two evolutions in the future, i.e., for-profit and non-profit activities will be connected seamlessly to sustain our society.

This book provides a good step to explore such a future direction of cities and human societies.

Kyoto, Japan
March 2017

Prof. Toru Ishida¹
Department of Social Informatics
Kyoto University

¹<http://www.ai.soc.i.kyoto-u.ac.jp/~ishida>.

Acknowledgements

This research has been partly supported by the project EADIC (<http://eadic.teithessaly.gr>), which was funded by European Union (European Social Fund—ESF) and Greek national funds through the Operational Program “Education and Lifelong Learning” of the National Strategic Reference Framework (NSRF)—Research Funding Program: ARCHIMEDES III. Investing in knowledge society through the European Social Fund. Moreover, pieces of this work were supported by the project InSmart (Integrative Smart City Planning) (<http://www.insmartenergy.com/>), which has received funding from the European Union’s Seventh Framework Programme for research, technological development and demonstration under grant agreement no 314164.

Special thanks to all contributors for their input in this study: Director of Tampere city’s development unit; Head of Telecommunications of Services Industriels de Genève (LSIG); Gale International; project manager of Smart City Wien; Director of Middleware Engineering and Rapid App Development of the World Bank; NYC DoITT’s Deputy and the Associate Commissioners; OGC Senior Administrative Officer, The Government of the Hong Kong Special Administrative Region; Strategic Planning Office (SPO) of the Municipality of Melbourne; and the Smart Dubai Office.

Finally, I would like to thank Prof. Toru Ishida, Kyoto University, Japan, for his Foreword, which opens future perspectives of the topics discussed in this book and for his contributed interview. His work and his case of the Digital City Kyoto inspired me to engage with the smart city context.

Papers that have been conceptualized by this book, contributed to its context and being referenced wherever they are utilized:

1. Anthopoulos, L. (2017). Smart Utopia VS Smart Reality: Learning by Experience from 10 Smart City Cases. *Cities*, 63, pp. 128–148.
2. Anthopoulos, L., Janssen, M. and Weerakkody, V. (2016) A Unified Smart City Model (USCM) for smart city Conceptualization and Benchmarking. *International Journal of e-Government Research (IJEGR)*, 12(2), pp. 76–92.

3. Anthopoulos, L., Fitsilis, P. and Ziozias, C. (2016). What is the Source of Smart City Value? A Business Model Analysis. *International Journal of e-Government Research (IJEGR)*, 12(2), pp. 55–75.
4. Anthopoulos, L. and Reddick, Ch. (2015). Understanding electronic government research and smart city. *Information Polity*, vol. 21, no. 1, pp. 99–117. DOI: [10.3233/IP-150371](https://doi.org/10.3233/IP-150371)
5. Anthopoulos, L. and Fitsilis, P. (2014). Smart Cities and their Roles in City Competition: A Classification. *International Journal of Electronic Government Research (IJEGR)*, 10 (1), pp. 67–81.
6. Anthopoulos, L., Ipsilantis, P., Kazantzi, V. (2014). The Project Management Perspective for a Digital City. *International Journal of Information Technology Project Management (IJITPM)*, 5(1), IGI Global.
7. Anthopoulos, L. and Giannakidis, G. (2016). Task-Based Process Modeling for Policy Making in Smart Cities. In the *Proceedings of the 8th ITU Kaleidoscope Academic Conference*, Bangkok, Thailand, Nov. 14–16, 2016.
8. Anthopoulos, L., Giannakidis, G. and Sakkas, S. (2016). Realizing, Modeling and Evaluating City’s Energy Efficiency: the case of InSmart in the city of Trikala, Greece. In the *Proceedings of the 3rd International Conference for E-Democracy and Open Government, Asia 2016 (CEDEM ASIA 2016)*, Daegu, S. Korea, Dec. 7–9, 2016.
9. Anthopoulos, L. (2015). Defining Smart City Architecture for Sustainability. In the *Proceedings of the 14th IFIP Electronic Government (EGOV) and 7th Electronic Participation (ePart) Conference 2015, 30th August - 3rd September 2015, Thessaloniki, Greece*.

Contents

1	Introduction	1
2	The Rise of the Smart City	5
2.1	Defining the Terms	5
2.2	What Is <i>Smart City</i> ?	7
2.3	The Smart City Evolution	13
2.4	City and Smart City Classes	22
2.5	Smart City Architecture	31
2.6	Conclusions	40
	References	42
3	The Smart City in Practice	47
3.1	Smart Technologies	47
3.1.1	Smart Water	47
3.1.2	Smart Energy	50
3.1.3	Smart Transportation	56
3.1.4	Smart Health	59
3.1.5	Smart Safety and Emergency	60
3.1.6	Smart Education and Smart Tourism	63
3.1.7	Smart Waste Management	64
3.1.8	Smart Buildings	64
3.1.9	Smart Government	67
3.1.10	Smart Economy	67
3.1.11	Telecommunication Networks	68
3.1.12	Sensors and Internet-of-Things	71
3.1.13	Data, Big Data, Data Analytics and Open Data	75
3.1.14	Crowd-Sourcing and Crowd-Sensing	82
3.1.15	Cloud Computing	84

- 3.2 Smart Services 86
- 3.3 Smart City Standards 96
- 3.4 Smart City Cases in Practice 104
 - 3.4.1 The Case of Trikala. 106
 - 3.4.2 The Case of Tampere 111
 - 3.4.3 The Case of Geneva 115
 - 3.4.4 The Case of Seoul. 119
 - 3.4.5 The Case of New Songdo 124
 - 3.4.6 The Case of Vienna. 129
 - 3.4.7 The Case of London 134
 - 3.4.8 The Case of Washington DC. 138
 - 3.4.9 The Case of New York City (NYC) 142
 - 3.4.10 The Case of Hong Kong 145
 - 3.4.11 The Case of Melbourne City Council 151
 - 3.4.12 The Case of Dubai 156
 - 3.4.13 The Case of Kyoto 163
 - 3.4.14 Discussion 167
- 3.5 Conclusions 176
- References. 178
- 4 The Smart City Market 187**
 - 4.1 The Smart City Value. 187
 - 4.2 Types of Companies in Smart City. 188
 - 4.3 Smart City Business Models. 189
 - 4.4 City Branding Versus Smart City? 202
 - 4.5 Conclusions 208
 - References. 209
- 5 Governing a Smart City 215**
 - 5.1 Introduction 215
 - 5.2 Smart City Development Framework 217
 - 5.2.1 Framework Step 1: Collect Information Regarding the Smart City Objectives 217
 - 5.2.2 Framework Step 2: Collect Information About the City 218
 - 5.2.3 Framework Step 3: Define Layers 219
 - 5.3 Smart City as Project 222
 - 5.3.1 Defining the Project Mission. 224
 - 5.3.2 Mobilizing the Resource Base. 227
 - 5.3.3 Riding the Project Life Cycle 228
 - 5.3.4 Leading the Project Coalition 230
 - 5.3.5 A Project Management Model for Smart City Development 232

- 5.4 Smart City as Innovation 233
 - 5.4.1 Where Innovation Lies Within a City? 233
 - 5.4.2 Measuring Innovation Capacity 234
 - 5.4.3 An Innovation Management Model for Smart City 241
- 5.5 Service Deployment Within Smart City: An Example
from Energy Efficiency 245
- 5.6 Conclusions 258
- References. 259

- 6 Smart Government: A New Adjective to Government
Transformation or a Trick? 263**
 - 6.1 Defining Smart Government 263
 - 6.2 Smart Government in the Era of Global Urbanization
and the Internet of Things 274
 - 6.3 Smart Government Evolution and Driving Forces 276
 - 6.3.1 Data and Smart Government 279
 - 6.3.2 Connecting People, Process, Data and Things 282
 - 6.3.3 Co-produce with Citizens 285
 - 6.3.4 Co-decide with Citizens 287
 - 6.4 Conclusions 288
 - References. 289

About the Author



Leonidas G. Anthopoulos is Associate Professor at the Business School of the TEI of Thessaly and Director of the Postgraduate Program in Project and Programme Management. Dr. Anthopoulos has extensive IT research, planning and Management experience with regard to the development and deployment of complex IT projects. He is a member of various committees, worth mentioning the ITU Smart City Focus Group, Associate Editor of the IJPADA journal (IGI-GROUP) and editor of book collections. Some of his articles can be found on Government Information Quarterly, Information Polity, Transforming Government, etc. His research interests concern, among others, Smart City, e-Government, Enterprise Architecture, Strategic Management, etc.