

Transactions on Computational Collective Intelligence XXV

Preface

Modern agglomerations face the challenge of changes arising from the needs and requirements of their residents, and from either acceptance or rejection of the “smart cities” vision. The consideration of these requirements and the acceptance of the vision are a long-term process in which municipal decision-makers, city residents, and civic organizations work out a compromise, which is often the result of merit-based decisions by the authorities but can also result from political decisions on which the residents only have an indirect influence. Such a complex city system – seen from the perspective of the authorities, city residents, and organizations, and taking into account many decision-making processes that are hard to control and analyze – represents a complex environment for the implementation of information technology supporting city management processes.

Owing to the aforementioned considerations, the process of IT implementation represents a system of complex technology- and management-related mechanisms (more focused on management-related ones), whose pre-implementation analysis becomes crucial for building a successful strategy for the completion of such projects. Therefore, a relatively large amount of information is published on the functioning of cities in the context of their transformation to smart cities and on the technologies applied both in system design and implementation; experiences are also presented of cities that were, have been, or will be in some stage of such a transformation.

The set of papers presented here (prepared by the team) is part of the presentation of descriptions of such transformation processes. It is based on the experiences of the CAS design team (IBM Centre for Advanced Studies on Campus), making use of IBM IOC (Intelligent Operating Centre) consisting of six members (Cezary Orłowski, Tomasz Sitek, Artur Ziółkowski, Paweł Kapłański, Aleksander Orłowski, Witold Pokrzywnicki). The technology framework of smart cities systems (where IOC may be given as an example) shows the opportunities and constraints for the implementation of city processes. It also enables a broader model-based analytical view of city processes and the specific information technologies applied in order to model and implement these processes. Taking into account this form of presentation, the papers consider three perspectives of the design and implementation of smart cities systems.

The first perspective is the client perspective, i.e., of the city and its organizational processes and the possibilities of applying measurements to these processes. In the first paper, “High-Level Model for the Design of KPIs for Smart Cities Systems,” two points of view are considered: a high-level view within which the city processes are discussed and confronted with measurements in the form of key performance indicators (KPIs) and a low-level one showing to what degree the available indicators may be applied to measure the city’s processes. Within this perspective in the second paper, “Implementation of Business Processes in Smart Cities Technology,” the model of the

city processes is presented and the authors' own measurements for assessing the maturity of these processes are suggested. Moreover, opportunities for enhancing the KPIs through creating integrated or dynamic KPIs are indicated. These two papers aim (a) at showing to what extent the present approaches based on KPIs may be applied in the design framework delivered by software developers and (b) at suggesting measurements for assessing the maturity of these processes.

The second perspective is the project perspective, on which two papers are presented. In the paper "Designing Aggregate KPIs as a Method of Implementing Decision-Making Processes in the Management of Smart Cities," a low-level view of the project in the context of management processes is described. The fourth paper, "Smart Cities System Design Method Based on Case Based Reasoning," illustrates an approach resulting from the need to treat both the development process management method and system implementation as components that may be used by any city. Both of these papers provide methodology-based support for the management and implementation processes of smart cities systems.

The third perspective is the provider's perspective. Here, two papers are presented that describe low-level and high-level approaches. In the fifth paper of the volume, "Model of an Integration Bus of Data and Ontologies of Smart Cities Processes," the high-level approach to using an ontology for supporting the construction of a high-level architecture is presented. The construction of such an architecture becomes necessary in the case of an agile approach to project management. The authors' experiences connected with use of agile methods show that the availability of an ontology of concepts (objects and processes, both development-related and management-related ones) significantly simplifies the design of sprints and the prioritizing of backlog tasks. In the sixth paper, "Ontology of the Design Pattern Language for Smart Cities Systems," the second low-level perspective, the significance of building an integration bus for a joint view of development processes, technology, and artifacts, as well as the products of the design and implementation of smart cities are described.

Additionally, we include two papers concerning the dynamic and semantic assessment of systems. In their contribution, Vo Thanh Vinh and Duong Tuan Anh propose two novel improvements for minimum description length-based semisupervised classification of time series: an improvement technique for the minimum description length-based stopping criterion and a refinement step to make the classifier more accurate. In the eighth paper by B. John Oommen, Richard Khour, and Aron Schmidt, the problem of text classification is explained using "anti"-Bayesian quantile statistics-based classifiers.

The papers presented are the result of shared projects on organizational solutions, carried out together with IBM, such as the 10-year period of collaboration within the Academic Initiative, Competence Centre and Centre for Advances Studies on Campus, and also research projects carried out at the Gdańsk University of Technology and CAS. During 2011–2015, the international research project Eureka E! 3266 (EURO-ENVIRON WEBAIR) "Managing Air Quality in Agglomerations with the Use of a www Server" was carried out. The Armaag Foundation, IBM, DGT, Gdańsk City Council, and the Marshall's Office in Gdańsk all took part in the project. The project objective was to create an IT system supporting decisions with regard to dust pollution

and noise in Gdańsk. Hence the project was addressed to City Council analytical units, which deal with the conditions of such decisions.

The second project was the PEOPLE MARIE CURIE ACTIONS project carried out within the International Research Staff Exchange Scheme called: FP7-PEOPLE-2009-IRSES “Smart Multipurpose Knowledge Administration Environment for Intelligent Decision Support Systems Development,” and continued until the end of March 2015. The goal of the project was the development by the Australian partner (University of Newcastle) of an environment for the building of intelligent decision support systems based on SOEKS (Set of Experiences). The data/cases for the verification of the environment were provided by the partners, namely, the Gdańsk University of Technology and Vicomtech from Spain. In the schedule of the project, three verification cases had been envisaged, and one of them was the data concerning the design of a smart cities system for Gdańsk within the Eureka project.

The synergy of these two projects and the experience of many business partners collaborating in both projects, as well as the close cooperation between CAS and IBM Polska, created the conditions for such a comprehensive assessment of smart cities systems. The three perspectives presented in the work – i.e., that of the client of the city, the smart cities for the Gdańsk project, and the provider, CAS Gdańsk – close the first stage of experiences covering system design and implementation. The papers on this work (covering the three perspectives) were prepared so as to have a generic and component-specific dimension and may serve as guidelines in both the design and implementation of smart cities systems for a number of cities.

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