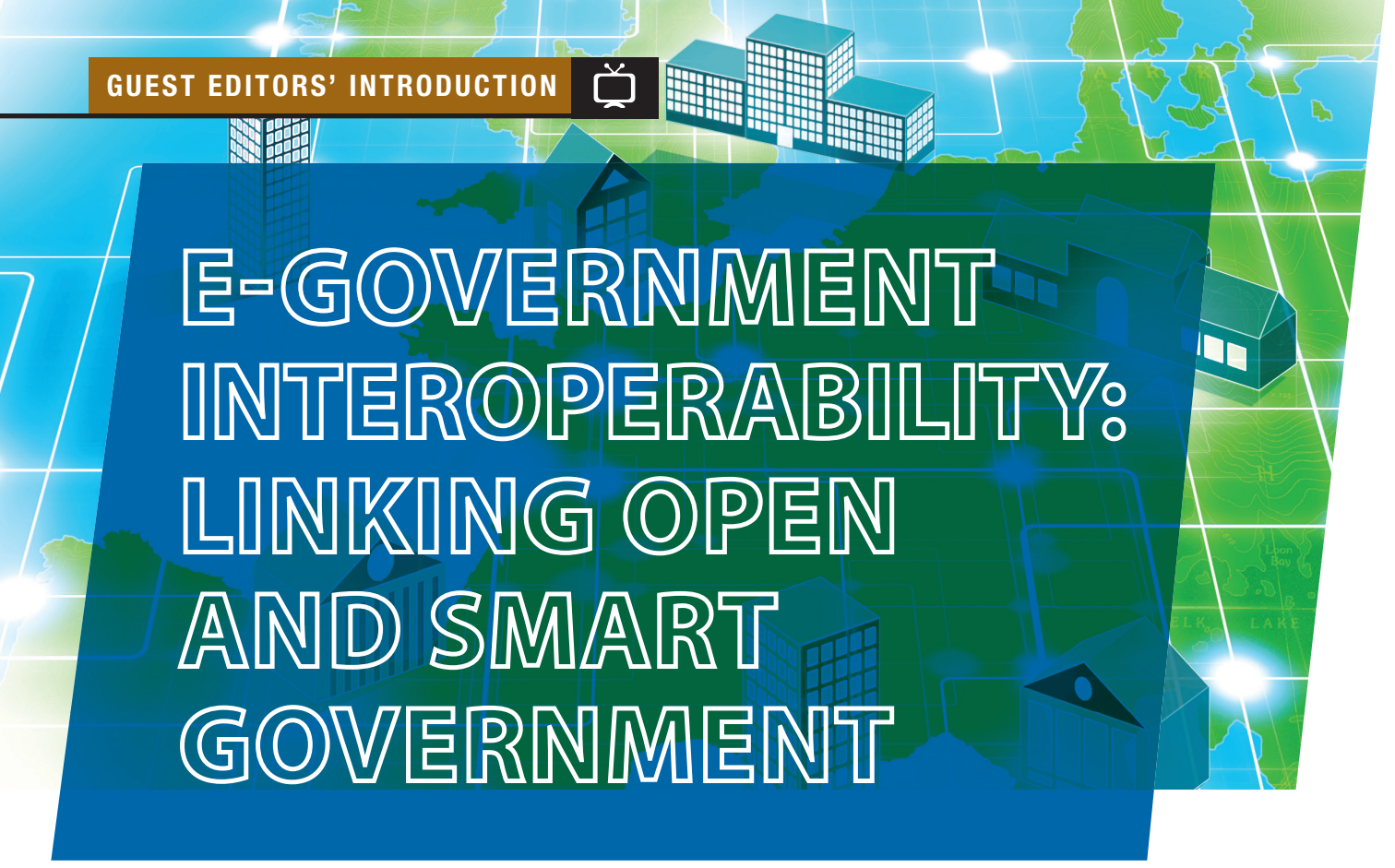

E-GOVERNMENT INTEROPERABILITY: LINKING OPEN AND SMART GOVERNMENT

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As technological advances in data gathering, processing, and management continue, our ability to move from an information society to a "smart" society will increasingly rely on improvements and expansion in technical, organizational, and other aspects of e-government interoperability.

In 1990, IEEE published one of the first standardized definitions for interoperability,[1] describing it as the ability of two or more systems or components to exchange information and then use the information that has been exchanged. In the meantime, as society has evolved, so has the concept of interoperability.

Twenty-four years later, interoperability describes how well diverse organizations interact—in part by sharing information and knowledge through business processes that support data exchange among their systems.[2] Indeed, the interoperability principle[3] has evolved into a complex concept that includes different dimensions (technical, semantic, organizational, and legal, to name a few) and governance models. As a new multidimensional interoperability perspective emerges, the focus shifts more toward recognizing organizational interoperability capabilities.

In fields related to public administration—everything from e-justice to e-health,[4] for example—interoperability is the key "back office" element in architecture, the government cloud, open government data semantics, and so on. Holistically, e-government—which could be broadly defined as the adoption of information and communications technology (ICT) by these public administrations—interoperability is essential for government services provision and can improve efficiency, effectiveness, transparency, and citizen-oriented systems. Further supporting its importance, interoperability is mentioned in 9 of the 10 requirements described in the US National Institute of Standards and Technology's High-Priority Requirements to Further USG Agency Cloud Computing Adoption.[5]

In serving their citizens, government administrations continually face new challenges, and e-government interoperability is an area of strategic importance. At the local, regional, and national levels, supranational organizations, companies, and other large

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enterprises are investing in improving their ability to navigate the information- and knowledge-based economy. Thus, interoperability—although founded on technical aspects of data collection and retrieval—is inherently multidimensional and can neutralize barriers to information exchange.[6]

ICT adoption in public organizations has been transformative and led to a shift toward open government, where information can be more easily exchanged between an organization and its constituent parts. Indeed, interoperability as a back office ICT function both relies on and fosters collaboration—a key principle in open government.[7] Although the variety in evolution and maturity levels associated with these changes continues to pose challenges with each move forward, achieving open government is nevertheless essential to achieving any level of "smart government"—including secure smart and digital cities.[8,9]

The complexity of this field and the IEEE Computer Society's leadership role in ICT led to the establishment of the IEEE Computer Society e-Government Special Technical Community (STC), and one of its first projects is launching this special issue of *Computer*.

IN THIS ISSUE

We received over 20 submissions to our call for papers and selected 6 articles on the latest developments and implementation in e-government interoperability. Most of the papers came to us from Europe, where big, open, linked data is a key focus of the European Commission (EC).

In "Promoting Interoperability in Europe's E-Government," Konstantinos Bovalis, Vassilios Peristeras, Margarida Abecasis, Raul Mario Abril Jimenez, Miguel Alvarez Rodriguez, Corinne Gattegno, Athanasios Karalopoulos, Ioannis Sagias, Szabolcs Szekacs, and Suzanne Wigard describe the EC's Interoperability Solutions for European Public Administrations program (ISA), a holistic approach to interoperability challenges. During the economic crisis of the past decade, public administrations across Europe had to modernize or be forced to cut services. The authors describe how this EC model fosters increased interoperability across technical, semantic, organizational, and legal levels to improve transborder services delivery.

Next is a vertical view of the e-health field. In "E-Health Demystified: An E-Government Showcase," author Mario Kovač describes the complexity of interoperability in the e-health field, and why its implementation is necessary. Adopting an e-health strategy, as the Croatian National Healthcare System model suggests, could help governments or other organizations rein in burgeoning healthcare costs—an issue of critical importance as populations are living longer and therefore facing increasingly complicated or expensive treatment regimens—by increasing efficiency and streamlining care delivery.

In "Interoperability in Big, Open, and Linked Data—Organizational Maturity, Capabilities, and Data Portfolios," Marijn Janssen, Elsa Estevez, and Tomasz Janowski delve into the data-management details. The authors describe a way to assess organizational readiness by categorizing interoperability into four types and then qualitatively gauge organizational maturity and capabilities. When it comes to managing interoperability in big and open data, the authors explain how creating data portfolios and using metadata can help to better target data collection and allow for more efficient data handling as organizations transition toward ubiquitous information sharing.

In "Quantifying the Interoperability of Open Government Datasets," Pieter Colpaert, Mathias Van Compernolle, Laurens De Vocht, Anastasia Dimou, Miel Vander Sande, Ruben Verborgh, Peter Mechant, and Erik Mannens exploit semantics and introduce a method for determining interoperability—how closely two datasets share relevance as well as the number and extent of conflicts.

In "ESCO: Boosting Job Matching in Europe with Semantic Interoperability," Martin le Vrang, Agis Papantoniou, Erika Pauwels, Pieter Fannes, Dominique Vandensteen, and Johan De Smedt continue the theme of semantic analysis, explaining elements and structures of datasets as they apply to a job-matching service. As datasets become more interoperable and thus cross regional, national, and linguistic boundaries, the nature of the challenges likewise expand. The authors examine not only semantic dimensions of data interoperability, but also those pertaining to legal, organizational, and technical dimensions.

Finally, Jesús Cano, Roberto Hernández, and Salvador Ros approach the topic from a more practical—and political—dimension in "Distributed Framework for Electronic Democracy in Smart Cities." The authors developed OpenILP, a hub for citizens to electronically sign initiatives for popular legislation—signatures with legal value. Bringing together elements of social media, crowdsourcing, and authentication in a tool based on open data interoperability, the authors present a platform from which citizens can effect legitimate policy change, rather than just an exchange of information.

We hope you enjoy this diverse overview of e-government interoperability's most recent advances, and find the authors' approaches to the challenges innovative and interesting.

References

1. *IEEE Std 610.12-1990, IEEE Standard Glossary of Software Engineering Terminology,* IEEE CS, 1990, p. 42.
2. European Union, "Decision No 922/2009/EC of the European Parliament and of the Council of 16/September/2009 on Interoperability Solutions for European Public

Administrations (ISA)," *Official J. European Union*, 2009; http://ec.europa.eu/isa/documents/isa_lexuriserv_en.pdf.
3. J. Roy, "E-Service Delivery and New Governance Capacities: 'Service Canada' as a Case Study," *Int'l. J. Services Technology and Management*, vol. 7, no. 3, 2006, pp. 253–271.
4. A. Solanas et al. "Smart Health: A Context-Aware Health Paradigm within Smart Cities," *IEEE Comm. Mag.*, vol. 52, no. 8, 2014, pp. 74–81.
5. National Institute of Standards and Technology, "US Government Cloud Computing Technology Roadmap [draft]," vol. 1, release 1.0, 2011, p. 11.
6. C.E. Jiménez, J.I. Criado, M. Gascó, "Technological e-Government Interoperability. An Analysis of IberoAmerican Countries," *IEEE Latin America Trans.*, vol. 9, no. 7, 2011, pp. 1112–1117; doi:10.1109/TLA.2011.6129711.
7. C.E. Jiménez, "Gobierno Abierto y Back Office: Reflexiones para su Implementación," *Boletín Institucional e-Governa*, no. 27, 2013,; www.municipioaldia.com.pe/facipub/download/contenido/dnl/fp_cont/3229/dlfnc/file/bol27_abril_2013_final.pdf.
8. C.E. Jiménez et al, "Smart Government: Opportunities and Challenges in the Development of Smart Cities, An IT & Public Organization Approach," *Democratic Strategies and Citizen-Centered E-Government Services*, Ć. Dolićanin, E. Kajan, and D. Randjel, eds., IGI Global, 2014, in press.
9. A. Martínez-Ballesté, P.A. Pérez-Martínez, A. Solanas, "The Pursuit of Citizens' Privacy: A Privacy-Aware Smart City Is Possible," *IEEE Comm. Mag.*, vol. 51, no. 6, 2013, pp. 136–141.

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