

# Government (Big) Data Ecosystem: Definition, Classification of Actors, and Their Roles

Syed Iftikhar Hussain Shah, Vasilis Peristeras, Ioannis Magnisalis

**Abstract**—Organizations, including governments, generate (big) data that are high in volume, velocity, veracity, and come from a variety of sources. Public Administrations are using (big) data, implementing base registries, and enforcing data sharing within the entire government to deliver (big) data related integrated services, provision of insights to users, and for good governance. Government (Big) data ecosystem actors represent distinct entities that provide data, consume data, manipulate data to offer paid services, and extend data services like data storage, hosting services to other actors. In this research work, we perform a systematic literature review. The key objectives of this paper are to propose a robust definition of government (big) data ecosystem and a classification of government (big) data ecosystem actors and their roles. We showcase a graphical view of actors, roles, and their relationship in the government (big) data ecosystem. We also discuss our research findings. We did not find too much published research articles about the government (big) data ecosystem, including its definition and classification of actors and their roles. Therefore, we lent ideas for the government (big) data ecosystem from numerous areas that include scientific research data, humanitarian data, open government data, industry data, in the literature.

**Keywords**—Big data, big data ecosystem, classification of big data actors, big data actors roles, definition of government (big) data ecosystem, data-driven government, eGovernment, gaps in data ecosystems, government (big) data, public administration, systematic literature review.

## I. INTRODUCTION

IN today's data-driven world, organizations are making efforts to create a data-driven culture in public organizations. To achieve a data-driven culture, organizations are adhering to basic (big) data principles. Such principles are about data generation, data storage, access to data, free flow of data, sharing of data, data publishing, data management, data analysis, data re(use), data protection, data privacy, and data preservation [1]-[3]. Globally, organizations are adopting state-of-the-art technological (big) data solutions to realize their value of (big) data, to promote data-driven decision making, and discover new business prospects [4]-[6].

Data are facts and figures about an object, and organizations usually process data, including raw data, as per their needs [4].

Syed Iftikhar Hussain Shah, Researcher and Ph.D. Candidate in eGovernment/Information Systems Management is with the School of Science & Technology, International Hellenic University, 14th km Thessaloniki - Moudania, 57001 Thermi, Greece (phone: +44-7932606032; e-mail: i.shah@ihu.edu.gr).

Dr. Vasilis Peristeras, Assist: Professor, and Dr. Ioannis Magnisalis, Associate of Assist Professor Vasilis Peristeras, are with the School of Science & Technology, International Hellenic University, 14th km Thessaloniki - Moudania, 57001 Thermi, Greece (e-mail: v.peristeras@ihu.edu.gr, i.magnisalis@ihu.edu.gr).

Organizations create, gather, and store data in different forms like textual, numeric, images, audio, and videos [7], [8]. Data are key strategic asset for the private, public sectors, and civil society. Organizations, particularly public sector organizations, are developing innovative abilities to transform data into information and knowledge for the data-driven government [4], [9].

Pospiech and Felden define big data as it can mean big volume, big variety, and big velocity. [10]. They further added that it is difficult to process big data without using cost-effective and unique innovative technological tools and analytical techniques [10]-[12].

Big Data is a paradigm shift in the perception of approaches to understand and study the world. Organizations are using big data to analyze fine-grained data to create numerous opportunities [13], [14]. In public sector organizations, such opportunities include efficient public service delivery, enablement of data-driven decision making for policymakers, enhancement of country digital economy, creation of new jobs for the youth, promote civic participation to define and improve public policies [12]-[15], and boost data value creation for the businesses [15]-[17].

We noticed different sources of (big) data in the literature. Examples of key (big) data sources include the smart mobile handsets, online social networks, Internet of Things (IoT), cloud computing solutions, and smart cities [18]-[20]. Public administrations process such sources of big data related to various public sectors like health, education, agriculture to promote data-driven administration [21]-[23].

We found different definitions of (big) data ecosystems in the literature. In these (big) data ecosystem definitions, we observed a common viewpoint amongst the research community that (big) data ecosystem is a network of different elements. We also noted that different elements of (big) data ecosystems like data, people, organizations, organizational procedures, and technology [24]. [25] define a big data ecosystem as a network of people and technologies to collect, handle, and use the (big) data and the interactions with each other [25].

Governments are aiming to create public value by accomplishing the needs and wishes of the public. Governments are implementing (big) data ecosystem in the public organizations to achieve such aims. Public administrations create, refine, store, analyze, access, manage, share, publish, re(use), protect, preserve data through (big) data ecosystem. Such data may be related to government employees, courts, taxes, agriculture crops, crimes. Moreover, (big) data ecosystem is the fundamental driver and enabler for

























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