Chapter 25

OPEN DATA: CHALLENGES AND OPPORTUNITIES FOR SERBIA

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ABSTRACT

The Government 3.0 paradigm for government operations aims at making the public administration systems more service-oriented and delivering customised public services by opening and sharing government-owned data to the public and businesses. In the last five years many European countries put forward Government 3.0 as a new paradigm, and as a result, improved efficiency in the provision of public services, increased transparency and interaction with citizens and society as a whole, but also created new businesses across Europe. This study is motivated by the need to find better strategies for delivering the data from both local and national governments to the public in a powerful, machine-readable and future-proof format. We examine the case of Serbia, give an insight into the current state of affairs in the country, and discuss how both governmental agencies and the citizens of Serbia can benefit from the Directive on the re-use of Public Sector Information (2013/37/EU). We explore also the technical aspects and challenges of implementation of the Directive, emphasizing the role of Open Data standards for improved interoperability and re-use.

Keywords: linked data, public sector information, best practices, policy implementation, interoperability

INTRODUCTION

The *Open Government Partnership* (OGP, https://www.opengovpartnership.org/) is a multilateral initiative that aims to secure concrete commitments from national and subnational

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governments to promote open government, empower citizens, fight corruption, and harness new technologies to strengthen governance. The initiative was launched in 2011 and since then it encouraged many countries around the world to initiate public reforms and make their *governments* more *open*, accountable, and responsive. Additionally, the topics of *Open Data*, *Big Data* and *Semantic technologies* have recently spawned a tremendous amount of attention among scientists, industry leaders and decision makers. Addressing European future societal challenges, the European Commission recently published two communications, which outline that the *Big Data* market is a great opportunity to create new jobs and growth (European Commission, 2014a) and state that "Data-driven economy stimulates research and innovation on data, increases business opportunities and availability of knowledge and capital across Europe." (European Commission, 2017)

This paper focuses on the Open Data ecosystem in the European area, especially in the Republic of Serbia. An Open Data ecosystem (European Parliament, 2013) consists of organizations and individuals, which generate, share and process datasets within their natural boundaries (Heimstädt, Saunderson, Heath, 2014) or beyond. Being part of an Open Data ecosystem, public agencies are struggling to deliver new generation of services that bring true value through higher quality data and improved applications, tailored to citizen needs (see actors on the left side of Figure 1). Being on the opposite side of the Open Data value chain, the business sector is in constant search for intelligent, innovative and personalized solutions that will fit a wide range of applications and thus generate profit (see actors on the right side of Figure 1). Such solutions must be flexible enough to adapt to the modern users' fast changing preferences, and extensible enough to accommodate their ever growing appetite for more (e.g., related data, new features, better interfaces, etc.). Nurturing a coherent European data ecosystem that will improve cross-border cooperation, will strengthen private-public partnership and will bring prosperity requires new solutions that are compliant with European Union and national legislations. Therefore, the work presented in this Chapter was primarily motivated by challenges and questions related to the technical aspects of the implementation of the Directive on the re-use of Public Sector Information which is known as the 'PSI Directive', 2013/37/EU (European Parliament, 2013a), such as:

- What does the Serbian Directorate for eGovernment need for PSI Directive implementation (in the national context), efficient data sharing, and PSI re-use?
- How the Open Data and new technologies facilitate innovations?

OPEN DATA ECOSYSTEM IN EUROPE

Figure 1 presents a simplified illustration of the Open Data ecosystem in the European area. The ecosystem is composed of five groups of data actors with different needs and capabilities (see examples in Table 1), where the needs from one actor are answered by the capabilities of others (Carrara et al., 2017; Janev et al., 2014), as follows:

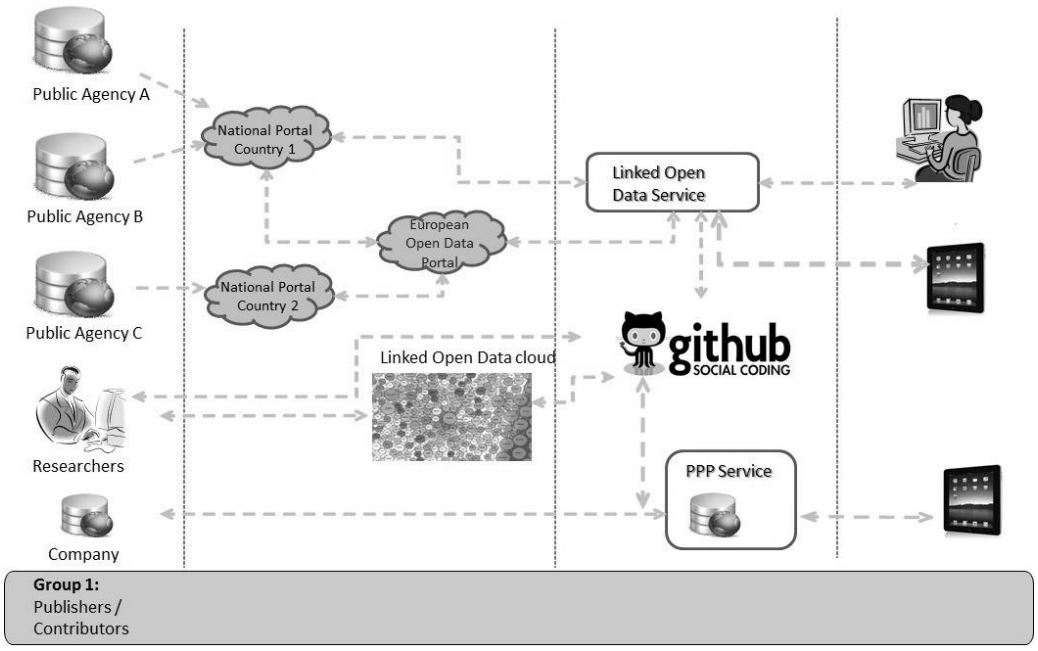

Figure 1. Open Data Ecosystem in the European area.

- **Data providers** are public organizations possessing datasets for which they include a description on one or more data portals, so that the datasets can be found more easily;
- **Government Agencies**, maintainers of national open data portals and/or data catalogues of the datasets made available by data publishers. Data portals make the description metadata of the datasets in their collection freely available to third parties. The national open data portals may also harvest collections of relevant datasets of other data portals (e.g., municipality data portals) and make them searchable via their user interface;
- **Metadata brokers**, such as the European Data Portal, facilitate the collection and exchange of description metadata between data portals, as well as provide metadata harvesting, transformation, validation, harmonisation, publication services, translation of datasets and other services; and
- **Public-Private partnership** services that support the ecosystem, facilitate the collaboration between stakeholders and exploitation of open data/services;
- **Data consumers** use data portals of their choice to search through various collections of datasets. The data portals allow the user to explore, find, identify and select the datasets coming from different data providers. Data consumers can also be systems (machines). Many different types of data consumers exist such as academia, media-journalists, NGOs or citizens willing, for example, to improve transparency or to add value to their services by combining data.

Table 1. Examples of stakeholders (see Figure 1) in the Open Data Ecosystem

Label	Who	What	Description of activities
Group 1: Public Agency A	SEPA	contributes	Serbian Environmental Protection Agency (SEPA) contributes different datasets on the Serbian Open data portal, see https://data.gov.rs
Group 2: Public Agency	IT Office	organize and maintains	Office for Information Technology and e-government organizes the open data activities in Serbia (established a working group) and maintains the national open data portal
Group 1: Researchers	PUPIN	contributes	Institute Mihajlo Pupin has developed a set of tools for visualization of open data, http://www.linkeddata.rs/Products, and free lectures for starting to work with open data, http://www.linkeddata.rs/OpenDataHandbook
Group 3: Agency	EC	organize and finance	European Commission supports the development of European Open Data ecosystem through financing research and innovation projects and monitors the implementation of EU directives
Group 4: Services	GitHub	organize and maintains	GitHub is the world's leading software development platform where researchers share open-source tools for more efficient exploration of open data
Group 5:	Citizens	Use	Serbian Ministry of Health has developed an application for monitoring the daily statistics on the number of requests that pass through the IZIS (Integrated Health Information System of the Republic of Serbia) system, as well as the number of reviews, instructions and issued recipes, see https://live.mojdoktor.gov.rs/

DATA EXCHANGE AND INTEROPERABILITY IN EUROPEAN E-GOVERNMENT SYSTEMS

The process of providing cross-border public services across EU Member States is complex, due to the heterogeneity of the actors, information, and services of the different Member States. Interoperability is the ability of organisations to interact towards mutually beneficial goals, involving the sharing of information and knowledge between these organisations, through the business processes they support, by means of the exchange of data between their ICT systems (European Union, 2017). Since 1995, in order to support data exchange and interoperability, the European Commission has conducted several interoperability solutions programmes, where the last one "Interoperability Solutions for European Public Administrations" (ISA) is known under the name ISA^2 (European Commission. 2016). The ISA programme (from 2010 until 2016), that was implemented through more than 40 actions with a budget of some EUR 160 million, defined 'The European interoperability framework (EIF) as a commonly agreed approach to the delivery of European public services in an interoperable manner. The ISA² programme (from 1 January 2016 until

31 December 2020) offers public administrations 47 concrete recommendations on how to improve governance of their interoperability activities, establish cross-organisational relationships, streamline processes supporting end-to-end digital services, and ensure that both existing and new legislation do not compromise interoperability efforts.

European Interoperability Framework

The holistic European Interoperability Framework (European Union, 2017) foresees four levels of interoperability, namely legal, organizational, semantic and technical interoperability (see Figure 2). While the ISA recommendations (2010-2015) were more orriented towards implementation of G2G services, the goal of ISA^2 is to pay more attention to end-users outside public administration i.e., to citizens and businesses. The effectiveness of the programme and also the implications of EU Directives and policies on national ICT systems is constantly observed and measured by the Commission itself (e.g., the *National Interoperability Framework Observatory* activity) and/or with the help of independent consulting companies.

The European Interoperability Framework sets out 12 general interoperability principles and groups them into four categories:

1. Principle setting the context for EU actions on interoperability (subsidiarity and proportionality);
2. Core interoperability principles (openness, transparency, reusability);
3. Principles related to generic user needs and expectations (technological neutrality and data portability, user-centricity, inclusion and accessibility, security and privacy);
4. Foundation principles for cooperation among public administrations (administrative simplification, preservation of information, assessment of effectiveness and efficiency).

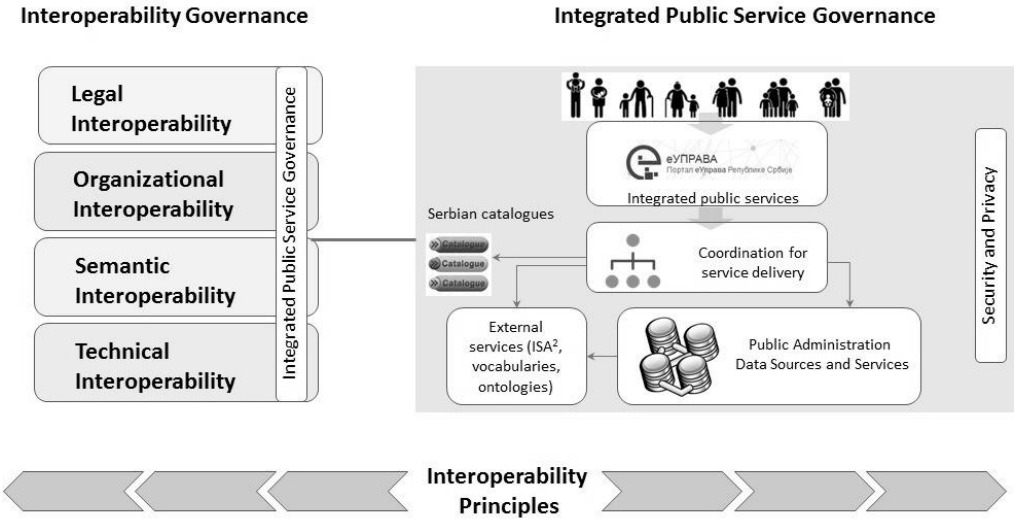

Figure 2. EIF Conceptual Model.

The concept of openness mainly relates to data, specifications and software. A common legal framework for reuse of public sector data is the Directive on the reuse of public sector information (European Parliament. 2013).

The PSI Directive

The PSI Directive, which revised the Directive 2003/98/EC and entered into force on 17 July 2013, provides a common legal framework for a European market for government-held data (public sector information). In 2003, the Directive introduced a common legislative framework regulating how public sector bodies should make their information available for re-use in order to remove barriers such as discriminatory practices, monopoly markets and a lack of transparency. In December 2011, the Commission presented a proposal to revise the Directive in order "to provide the market with an optimal legal framework to stimulate the digital content market for PSI-based products and services, including its cross-border dimension, and to prevent distortions of competition on the Union market for the re-use of PSI. The Commission proposal therefore targets the chain of commercial and noncommercial exploitation of PSI, to ensure specific conditions at different stages of the chain so that access is improved and re-use facilitated.". The revised Directive is thus built around two key pillars of the internal market: transparency and fair competition, and focuses on the economic aspects of re-use of information rather than on the accessibility of information to citizens.

Table 2. PSI Directive Related Documents

Year	Type	Title of documents retrieved from the European Commission
2003	Policy	DIRECTIVE 2003/98/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 November 2003 on the re-use of public sector information. Official Journal of the European Union L 345/90.
2011	Comm.	Open data An engine for innovation, growth and transparent governance, COM(2011)882..
2013	Policy	DIRECTIVE 2013/37/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 June 2013 amending Directive 2003/98/EC on the re-use of public sector information (2013, June 23). Official Journal of the European Union L 175/1.
2013	Policy	Regulation (EU) no 1316/2013 of the European Parliament and of the Council of 11 December 2013 establishing the Connecting Europe Facility. (2013, December 2013)
2014	Policy	Guidelines on recommended standard licences, datasets and charging for the reuse of documents (2014/C 240/01). Official Journal of the European Union C240/1-10 24.7.2014.
2016	Best practices	Collection of Best Practices of the network for innovation in European public sector information (https://www.w3.org/2013/share-psi/bp/) and Local Guidelines (https://www.w3.org/2013/share-psi/lg/)
2018	Policy	Digital Single Market, Proposal for a revision of the Public Sector Information (PSI) Directive, https://ec.europa.eu/digital-single-market/en/proposal-revision-public-sector-information-psi-directive

The PSI Directive is a legislative document and does not specify technical aspects of its implementation. Article 5, point 1 of the PSI Directive, for instance, says '*Public sector bodies shall make their documents available in any pre-existing format or language, and, where possible and appropriate, in open and machine-readable format together with their metadata. Both the format and the metadata should, in so far as possible, comply with formal open standards*.' Therefore, in July 2014, the Commission published guidelines (see "Guidelines on recommended standard licences…", European Commission. 2014b) related to licenses (encourages the use of open licenses), datasets (asks for availability, quality, usability and interoperability of 'high-demand' datasets) and charges where Commission prefers the least restrictive re-use regime possible i.e., limits any charges to the marginal costs incurred for the reproduction, provision and dissemination of documents. The Commission will also facilitate the roll-out of *open data infrastructures* under the Connecting Europe Facility (European Parliament, 2013b).

Analyzing the PSI Directive and other documents published by the European Commission so far (see Table 2), elements can be identified related to policies and legislation, software tools and platforms, selection of data for publication/dataset criteria, charging, techniques for opening data, organizational issues, formats, re-use, persistence, data quality issues, documentation of open data and data discoverability (Van Herreweghe, 2015; Janev, Mijović, and Vraneš, 2016).

WHAT DO WE NEED FOR STANDARDIZED AND EFFICIENT DATA SHARING AND RE-USE?

Background of Open Data Activities in Serbia

The EU accession process imposes different obligation related to harmonisation of Serbian legislation with EU regulations including the Directive on the re-use of public sector information. In the period 2014-2017, the main political driver for Open Data in Serbia was the Ministry of Public Administration and Local Self Government. The Ministry was responsible for preparation of two Open Government Partnership Action Plans (OGP AP), namely the 2014-2015 AP and 2016-2017 AP, as well as the Serbian *e-Government Strategy* (Directorate for Electronic Government of the Republic of Serbia, 2015). Since November 2017, the Directorate works as a part of the Government of Serbia under the name *Office for Information Technology and e-government*. In June 2015 with the support of the World Bank and the United Nations Development Programme (UNDP) an Open Data Readiness Assessment in Serbia (ODRA) was conducted and the results were presented at a conference held in December 2015 in Belgrade. In accordance to the 2014-2017 OGP Aps, the eUPRAVA portal (2018) (is a central point of access to e-services for all Serbian citizens (G2C), businesses (G2B) and employees (G2G) in public administration. Currently, more than 500 services are available on the portal, and about 130 bodies announced their services there. In order to facilitate the exchange of Open Data in Serbia and with other open government portals in Europe, in 2017, the new Open Data portal was promoted.

Transposing the PSI Directive in Serbia

The eGovernment Development Strategy of the Republic of Serbia (Directorate for Electronic Government of the Republic of Serbia, 2015) envisions a series of activities that have to be implemented for complete transposition of the PSI Directive in Serbia. Currently, the Law on Free Access to Information of Public Importance ("Off. Gazette of RS", no. 120/2004, 54/2007, 104/2009 and 36/2010) is the main legislative framework for publishing open data in Serbia. Prior to opening, the publisher (public organization that is opening the data) must check the legitimate exceptions to the default position for openness, for instance, the publication/disclosure affects

- the obligation of public sector organizations of confidentiality;
- the protection of privacy (unless the person to whom the data relates consents to the disclosure of data);
- the confidentiality of the work of the Government and the competent authorities which depend on it, the authority of the Assembly and public sector organizations.
- the economic, financial and commercial interests of public sector organizations.
- the confidentiality of information relating to international relations or relations with supranational institutions and other communities and regions.
- the public order and security, etc.

The technical details related to process of opening government data such as the use of licenses and "machine readable" approaches, processing costs (which should be maintained at a marginal level) and the payment of fees, are still under consideration of the Open Data Working Group (ODWG) lead by the Office for Information Technology and e-government.

LEARNING FROM EUROPEAN BEST PRACTICES

Financed by the EU Competitiveness and Innovation Framework Programme 2007-2013, in the period from 2014 until 2016, the SHARE-PSI network (2016) was involved in analysis on the implementation of the PSI Directive across Europe. The network was composed of experts coming from different types of organizations (government, academia, SME/Enterprise, citizen groups, standardization bodies) from many EU countries. Through a series of five public Workshops organized from the network, the experts were involved in discussing EU policies, thorough analysis of the content of the delivered presentations/papers, consensus building and writing atomic best practices for implementation of the PSI Directive. As a result a collection of Best Practices was established, https://www.w3.org/2013/share-psi/bp/, as valuable sources of information for public authorities and businesses about PSI Directive implementation. The partner organizations (Institute Mihajlo Pupin was involved from Serbia) were obliged to translate and adapt the guidelines to the local context. As a part of this activity the electronic book was published named Open Data Handbook, see http://www.linkeddata.rs/OpenDataHandbook.

Analyzing the applicability of the EU Best Practices in Serbia, we mapped the SHARE-PSI recommendations with the actual Action Plan for implementation of the eGovernment Strategy 2015-2016 (see Table 3). Two types of actions can be distinguished: related to organizational issues (ORG) and technology oriented actions (TECH).

Table 3. Challenges related to Open Data in Serbia (ORG/TECH), their linkage to SHARE-PSI Recommendations and status of activities in November 2016

Establish an Open Data Ecosystem, Develop and Implement a Cross Agency Strategy	ORG	A crucial role in the implementation of Serbian open data program (Zylstra, 2015) is establishment of the Open Data Working Group (ODWG) in 2016. *Status:* ODWG had its second meeting on May 30, 2018.
	TECH	The ODWG will need a technical infrastructure for managing meetings/notifications and storing documentation.
Identify what you already publish	TECH	This inventory building activity can be performed automatically or semi automatically. It is also part of the National Interoperability Framework (NIF) where an asset repository will be build. *Status:* NIF was adopted in 2014 by Ministry of Trade, Tourism and Telecommunications of the Republic of Serbia, however, the inventory of public datasets is not public.
Enable feedback channels for improving the quality of existing government data	TECH	*Status:* Feedback is currently collected by e-mail on the sites of the publishers.
Encourage crowdsourcing around PSI	ORG	In order to improve civil engagement, different promotional activities that raise awareness should be run. *Status:* First such activities was organized in 2015 (UNDP Serbia, 2016), while the last activity (Open Data Week) was organized in March 2018.
	TECH	*Status*: No public services available for integration of crowdsourced and public data.
Support Open Data Start Ups	ORG	*Status:* Different initiatives exist that support start-ups, see e.g., the Development Agency of Serbia, http://ras.gov.rs/, the Innovation Fund, http://www.innovationfund.rs/ or the Ministry of Economy, http://www.privreda.gov.rs/.
Publication Plan, Categorise openness of data	ORG	Acts exist that specify the criteria for 'high-value datasets', however additional consultation are needed to help government to understand which datasets to prioritize for publication.
	TECH	*Status:* The new Open Data portal provides access to 101 datasets (May 2018).
Standards for Geospatial Data	TECH	*Status:* The National framework for geodata exists since 2010 The Geodetic Authority (2010), responsible for national geodata infrastructure, is expected to meet inter-governmental demand (i.e., EU INSPIRE guidelines).
Enable quality assessment of open data	ORG	Additional acts needed that will specify the use of open licenses and vocabularies for describing datasets. *Status:* Does not exist in the moment of present analysis
	TECH	Quality assessment tools and services needed. *Status:* Few tools exist (Janev, Mijović, and Vraneš, 2013)

Analysis of Technological Challenges

The data available for public is truly open if it is equipped with machine readable metadata, see for example the World Bank (2018) definition of the term "Open Data". To make Open Data easier to find, most organizations create and manage Open Data catalogues. However, to be able to automate the search and information exchange between catalogues, open data standards are needed. Open data standards facilitate the interoperability of data by providing a common understanding of what is being described and how (Lee, 2016). Table 4 bellow presents a short list of standard vocabularies used across Europe and broader for publishing or describing Open Data.

Other vocabularies exist that have been used from early adopters for publishing Open Data in RDF Linked Data format. For example, see standards for publishing geospatial data (Simonis, 2015) or statistical data (Janev, 2016; Janev, Mijović, and Vraneš, 2016).

According to our analysis, the greatest challenge in implementing the PSI Directive in Serbia will be to open and express the description (metadata) about the available data/services on the eUPRAVA portal or elsewhere, in a compliant machine-processable format as is required for federation with other EU portals. Technical requirements for federation include (Fendler, 2015):

Table 4. PSI Directive Related Documents

Vocabulary	Description
DCAT	The **Data Catalogue Vocabulary**, https://www.w3.org/TR/vocab-dcat/, became a W3C Recommendation in January 2014. Making use of Dublin Core wherever possible, DCAT captures many essential features of a description of a dataset: the abstract concepts of the catalogue and datasets, the realizable distributions of the datasets, keywords, landing pages, links to licenses, publishers, etc.
Dublin Core	The **Dublin Core** Metadata Element Set (http://dublincore.org/documents/dces/) is a vocabulary of fifteen properties for use in resource description. The full set of vocabularies, DCMI Metadata Terms [DCMI-TERMS], also includes sets of resource classes (including the DCMI Type Vocabulary [DCMI-TYPE]), vocabulary encoding schemes, and syntax encoding schemes. The Dublin Core Metadata Element Set has been standardized as ISO Standard 15836:2009.
DCAT-AP	The **DCAT Application profile for data portals in Europe**, https://joinup.ec.europa.eu/asset/dcat_application_profile, is a specification based on the Data Catalogue vocabulary (DCAT) for describing public sector datasets in Europe. Its basic use case is to enable cross-data portal search for data sets and make public sector data better searchable across borders and sectors.
GeoDCAT-AP StatDCAT-AP	**Extensions** of the DCAT-AP for geospatial and statistical datasets, dataset series, and services. Both extensions have been developed in the context of the ISA² programme, http://ec.europa.eu/isa/isa2/index_en.htm.
SKOS	The **Simple Knowledge Organization System** (http://www.w3.org/2004/02/skos/) is a vocabulary that supports the use of knowledge organization systems such as thesauri, classification schemes, subject heading lists and taxonomies within the framework of the Semantic Web.

- Access to the harvested sites (login account or CKAN-API, FTP);
- DCAT Application Profile (DCAT-AP) for the government open data portal that will enable exchange of descriptions of datasets in the new Open Data portal and description of public services reachable via eUPRAVA with other portals, as well as aggregation of and search for datasets across data portals in Europe;
- Establishment of a Semantic Asset Repository and interlinking it with the JoinUp platform (Publication of the core vocabularies, code lists, INSPIRE metadata for geospatial data, etc.).

Once this metadata layer is established, innovative services that interlink datasets from different domains (e.g., statistical data with environmental on-line real data) can be implemented.

How does Open Data Facilitate Innovations?

The World Wide Web was created to overcome the wide spread difficulties that arose in the 1980s in attempting to exchange information between different systems, caused by incompatible networks, disk/data formats, as well as character-encoding schemes (Berners-Lee, 1996). The power of the Web today lies in the amount of data it holds. However, extracting information from a system of unstructured documents (The Web was originally envisioned as a virtual documentation system.) is often a tedious task. To obtain information, perform detailed analysis, and create new products or additional documents, a standard, machine-readable format is needed that allows for large-scale integration of, and reasoning on, data on the Web.

A decade ago, the Linked Open Data (LOD) movement emerged for organizations to make their existing data available in a machine-readable format. The Linked Data approach, based on principles defined back in 2006 by Tim Berners-Lee (Berners-Lee, 2006), enables linking of datasets through references to common concepts. HTTP URIs (Uniform Resource Identifiers) serves to name the entities and concepts, as well as relations (links) to other related URIs. The Resource Description Framework (RDF) is the model used for representation of the information (entities and concepts), as well as a model that enables exchange and reuse of structured metadata. In the last decade, the Linked Data approach has been adopted by an increasing number of data providers leading to the creation of a global data space that contains many billions of assertions—the Linked Open Data cloud, http://lod-cloud.net/. The cloud has increased from 12 datasets in 2007 to 1,139 in January 2017. One of the central interlinking hubs of the Linked Open Data cloud is the DBpedia (Auer et al., 2007), a rich multi-lingual knowledge base that represents content from Wikipedia in Linked Data format.

The process of integrating open data in existent application or developing innovations on top of open data and open-source tools can be divided into three phases: (1) initialization; (2) innovation; and (3) validation (see Table 5).

Table 5. Building innovative applications on top of Open Data

Initialization	
Business Objectives and Requirements: • Requirement specification, technical characterization, and setting up of demo site • Establishing acceptance (success) criteria for pilot applications validation based on performance characteristics, usability, and EU and national regulations (e.g., related to data access and security measures) **Data Categorization and Description:** • Analysis of datasets to be published • Selection of vocabularies and development of other specifications for metadata description	**Example Scenario:** • The goal is to share statistical data on different topics, via the national Open Data portal and integrate the datasets on the European Open Data Portal. Once available under a public license, open data from different sources can be merged and analyzed/visualized using linked data tools, see for instance the ESTA-LD tool in Figure 3 (Mijović et al., 2016). • Dataset will be selected from two data sources, namely the Dissemination database of the Statistical Office of the Republic of Serbia and the portal of the Serbian Business Registers Agency.
Innovation	
Components Selection and Tools Development: • Data access, transformation, and enrichment • Integration of security measures to deal with communication threats **Tools Customization for Pilot Applications:** • Customization of components for use in the targeted domain (i.e., statistical data publication, navigation, situational awareness, etc.)	In the innovation phase, the engineering staff customizes and develops the selected linked data components (open-source tools) to match the needs of the target application. This phase usually includes integration with existing enterprise systems and adoption of proven technologies for the benefits of the end-user organization.
Validation	
Continuous Validation: • The open-source tools that have been reused • Providing feedback to improve solution components • Tests with imperfect data **Testing and Replication:** • Business users • Citizens	Towards the end of the development (the validation phase), qualified testers who understand the business requirements collaborate with developers until fully operable and enterprise-ready tools are on market. **Example:** • A set of tools was installed at the Statistical Office of the Republic of Serbia to support the publishing of data in standardized Linked Data format, see (LOD2StatWorkbench, 2014) • The tools were published and shared for reuse via the GitHub, see https://github.com/GeoKnow/ESTA-LD

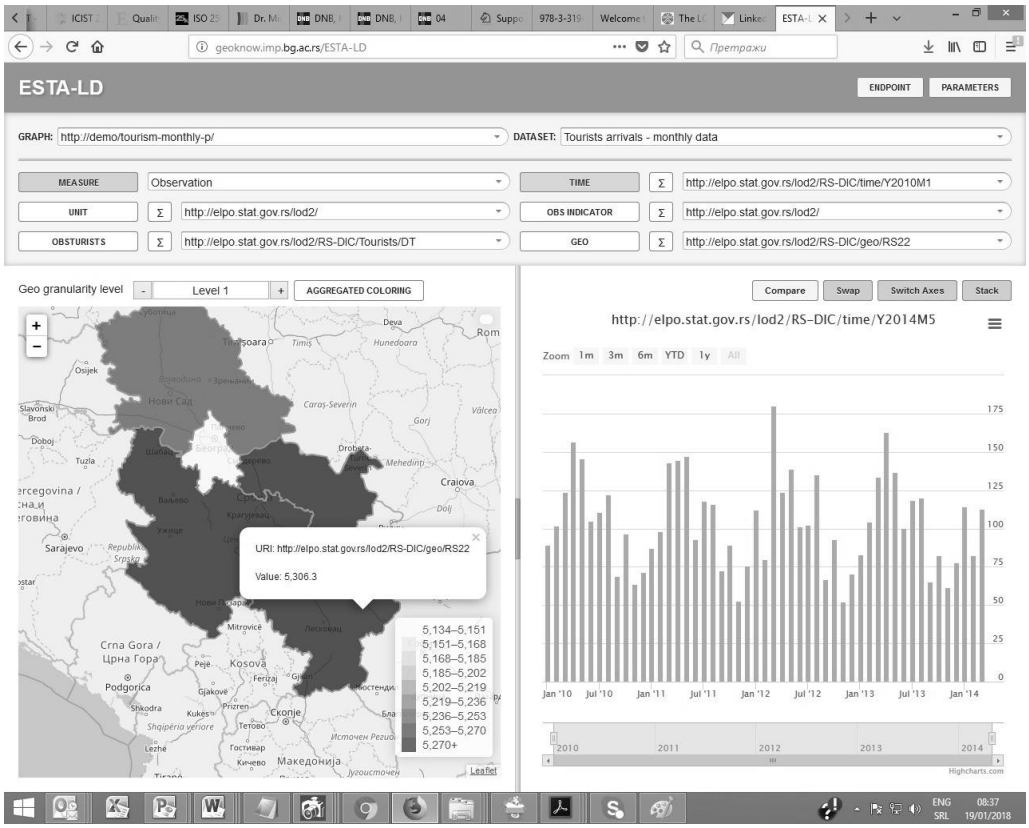

Figure 3. Decision support application based on open data (Mijović et al., 2016).

CONCLUSION

In accordance with the Serbian e-Government Strategy, the recently started activities around the establishment of a new Open Data portal, are a step towards the practical implementation of the PSI Directive. The Directive envisions publishing of the public/private datasets in a machine readable format, thus, making sharing, using and linking of information easy and efficient. This chapter introduced the ISA recommendations and the European Best Practices that are supposed to be wider adopted by Serbian national and local governments across Europe in future. Since policy actions differ across countries and depend on the local context, in this chapter the challenges related to the Open Data in Serbia have been analysed and presented in detail. Consulting results from opening data in EU countries, the following main user groups might benefit from publishing data in Open Data formats:

- **public administration and national government agencies** will benefit from uniformed description of resources (municipalities, locations) and classifications schemas that are basis for interoperable, trusted and smart services. Additionally, **transparent eGovernment** will benefit from the opportunity to demonstrate the efficiency and applicability of the Open Data strategy;

- **businesses** will benefit from (a) the newly opened up data, (b) the further standardization of the conceptualization in the domains of e.g., real estate, regional development and inspections, facilitating a higher level of reuse across the newly opened data, and (c) the strengthening of the data distribution channels (e.g., toward EU) by the improved DCAT based data catalogues;
- **ICT sector in general** will benefit from the novel product offerings for data management/fusion and analytics, new business models and value-added services based on open data;
- **citizens** will benefit from access to information of public interest and value-added public services. Citizens and non-government organizations will use the opened feedback channels to government to establish a broad engagement and empowering relationships with governments and various public institutions.

One of the greatest technical challenges is connected to the metadata management i.e., the way of describing the actual contents of the dataset which can then be published on well-known portals and catalogues, thus allowing data consumers to easily discover datasets that satisfy their specific criteria. In an attempt to foresee issues related to the PSI Directive, we have pointed out exceptions that should be considered prior to publishing data in open data format such as protection of privacy, confidentiality of the work of the Government and economic, financial and commercial interests of public sector organizations.

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