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**LEGISLATIVE PORTALS: ASSESSMENT
OF OPEN DATA GOVERNANCE AND
AVAILABILITY**

FINAL THESIS

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STATEMENT OF ORIGINALITY

I, Margareta Habazin, hereby declare that I am the author of the final thesis entitled **"Legislative Portals: Assessment of Open Data Governance and Availability."**

All sources and literature used in the preparation of this thesis have been clearly identified and properly listed in the bibliography at the end of the thesis. No other sources were used in its preparation, and no parts of other authors' works have been used without proper citation or in an unauthorized manner.

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Abstract

Digital transformation has significantly increased the availability of information and data, positioning open data as a strategic resource for economic growth, innovation, and public sector modernization. In response, governments worldwide have adopted open data policies with the aim of promoting the publication and reuse of public sector information. Within the European Union, successive legislative initiatives, culminating in the Directive EU/2019/1024 on open data and the reuse of public sector information, have strengthened the regulatory framework governing the publication and reuse of public sector information.

Among the various categories of open data, legal information and data are of particular importance due to their role in ensuring legal certainty, supporting decision-making, facilitating regulatory compliance, and promoting transparency and accountability within legal systems.

This paper focuses on legislative portals as a specific type of open data portal that provides access to legal data. It examines the governance of legislative portals, including both policy and organizational dimensions, and evaluates the extent to which legal data are made available in accordance with established open data principles. Despite the growing importance of legal data as a form of open data, legislative portals that provide legal data remain underexplored in the open data literature, and no widely recognized assessment framework currently exists for their systematic evaluation. To address this gap, the research develops a dedicated assessment framework for legislative portals based on existing open data theories and models. The proposed framework is applied to legislative portals in Croatia, Slovenia, and France through a comparative case study.

The analysis identifies similarities and differences in governance arrangements and in the quality and availability of open data across the selected jurisdictions. It further assesses compliance with open data principles and identifies barriers that limit the effective reuse of legal data. Based on the findings, the paper proposes recommendations for improving legislative portals and enhancing the accessibility and reusability of legal information and data. By developing a dedicated assessment framework for legislative portals, this research contributes to the literature on open data, open data portals, and legal data accessibility. Moreover, the proposed assessment tool for legislative portals offers practical value, broader applicability, and can serve as a framework for future research and evaluations of legislative portals across different jurisdictions.

Keywords: *open data, public sector information, legal data, legislative portals, data reuse*

Sažetak

Digitalna transformacija značajno je povećala dostupnost informacija i podataka, pri čemu su otvoreni podaci postali strateški resurs za poticanje gospodarskog rasta, inovacija i modernizaciju javnog sektora. Kao odgovor na navedene promjene, vlade diljem svijeta usvojile su politike otvorenih podataka s ciljem poticanja objave i ponovne uporabe informacija javnog sektora. U Europskoj uniji kontinuirane zakonodavne inicijative na području otvorenih podataka, kulminirale su donošenjem Direktive (EU) 2019/1024 o otvorenim podacima i ponovnoj uporabi informacija javnog sektora, kojom je dodatno ojačan regulatorni okvir kojim se uređuju objava i ponovna uporaba informacija javnog sektora.

Među različitim kategorijama otvorenih podataka, pravne informacije i pravni podaci imaju osobitu važnost zbog svoje ključne uloge u osiguravanju pravne sigurnosti, potpori donošenju odluka, olakšavanju usklađenosti s propisima te promicanju transparentnosti i odgovornosti unutar pravnih sustava. Stoga je ovaj rad usmjeren na zakonodavne portale kao posebnu vrstu portala otvorenih podataka koji omogućuju pristup pravnim podacima. U radu se analizira upravljanje zakonodavnim portalima, uključujući njihove pravne i organizacijske aspekte, te se procjenjuje u kojoj su mjeri pravni podaci dostupni u skladu s utvrđenim načelima otvorenih podataka. Unatoč rastućoj važnosti pravnih podataka kao oblika otvorenih podataka, zakonodavni portali koji ih objavljuju i dalje su nedovoljno istraženi u literaturi o otvorenim podacima, a trenutno ne postoji ni općeprihvaćen okvir za njihovu procjenu i evaluaciju. Kako bi se premostio navedeni nedostatak, u okviru ovog istraživanja razvijen je poseban okvir za procjenu i evaluaciju zakonodavnih portala, utemeljen na postojećim teorijama i modelima za evaluaciju otvorenih podataka. Predloženi okvir za procjenu primjenjuje se na zakonodavne portale Hrvatske, Slovenije i Francuske primjenom komparativne metode studije slučaja.

Analiza utvrđuje sličnosti i razlike u modelima upravljanja te u kvaliteti i dostupnosti otvorenih podataka u odabranim državama. Nadalje, procjenjuje se usklađenost s načelima otvorenih podataka te se identificiraju prepreke koje ograničavaju učinkovitu ponovnu uporabu pravnih podataka. Na temelju dobivenih rezultata predlažu se preporuke za unaprjeđenje zakonodavnih portala te poboljšanje dostupnosti i mogućnosti ponovne uporabe pravnih informacija i podataka. Razvojem posebnog okvira za procjenu zakonodavnih portala ovo istraživanje doprinosi znanstvenoj literaturi o otvorenim podacima, portalima otvorenih podataka i dostupnosti pravnih podataka. Nadalje, predloženi okvir ima i praktičnu vrijednost jer može poslužiti kao polazište za buduća istraživanja zakonodavnih portala u različitim pravnim sustavima.

Ključne riječi: *otvoreni podaci, informacije javnog sektora, pravni podaci, zakonodavni portali, ponovna uporaba podataka*

1. Introduction

The digital age has dramatically changed the way people live and work. The digital transformation, the development of digital technologies, the increase in data volume, and the shift towards the digital economy have affected people's lives, businesses, and the public sector. Large amounts of information and data from various sources have become available to individuals and businesses. Nowadays, more data is generated, accumulated, and stored than in previous decades (Jetzek et al., 2012). As a derivative of the digital revolution, data has become an essential tool for growth, innovation, and development of data-driven products and services that advance people's lives (Charalabidis et al., 2018). In this context, data holds enormous potential across various fields such as healthcare, smart cities, and transportation, and is widely considered a vital resource for economic growth and innovation.

However, the opening of data by public organizations has happened recently. According to van Loenen et al. (2018), open data is data that does not have any barriers and limitations for its use and reuse - data in machine-readable formats that can be accessed, shared, used, and reused without any restrictions for any user. Although public organizations have made their data available, the potential of open data can only be unlocked when it is shared and reused (Vrček, 2015). The provision of open data in machine-readable formats enhances its reusability, enabling individuals and businesses to think, innovate, and collaborate in novel ways. Also, open data is associated with a more open, transparent, and efficient government (Welle Donker & van Loenen, 2017). Since data is essential for the well-functioning of society, governments worldwide have begun to exploit the potential of broader distribution and reuse of open data. Over the last couple of years, many governments have enabled the release of government data, given that data is produced by public authorities within their competence and from public funds, without restriction or charge for its (re)use by individuals and businesses (Máchová & Lnénicka, 2017).

In the European Union, the public sector of member states generates and produces enormous amounts of data and information, known as public sector information (PSI), which is a valuable resource for the digital economy. In 2003, with the aim of encouraging member states to make data and information held by public sector bodies available for reuse, the European Commission established a regulatory framework for open data through the PSI Directive (Directive 2003/98/EC), to facilitate the reuse of public sector information. Since then, the European Union has been actively promoting the reuse of public sector information. However, as the reuse of public sector information (PSI) had not reached its full potential and further

measures were needed to stimulate reuse, the PSI Directive was revised in 2013. This revision (Directive 2013/37/EU) expanded the scope of the PSI Directive to include additional public bodies; limited fees charged by public authorities to marginal costs as a general rule; and established machine-readable formats as the standard. Since then, public organizations in member states have made significant progress in opening public data, enabling freer access and reuse by individuals and businesses (Máchová & Lnénicka, 2017; Andraško & Mesarčík, 2018).

Building on this momentum and recognizing the central role of the European Union's open data market in the broader EU data economy, the new Directive (Directive EU/2019/1024) on the reuse of public sector information, also known as the Open Data Directive, was adopted in 2019. The Open Data Directive introduces the concept of high-value datasets and significantly expands public authorities' obligation to publish open data. It mandates that public sector information, such as legal data, be made available for reuse, including for commercial purposes, under fair and non-discriminatory conditions.

The scope of this paper is legal information and data. Legal information and data are a specific set of information that presents a law, legal system, and legal processes. The legislative documents that constitute the different types of legal data include acts, bills, case law, administrative decisions, and similar documents. In general, legal data is an essential source of open data and a crucial factor underpinning decision-making across numerous fields. Policymakers, legal experts, professionals, and legal scholars are constantly interested in and involved in dealing with legal data (Alexopoulos et al., 2021).

On the other hand, the fundamental legal system presumption of knowledge of the law and legal rules holds that everyone must know the regulations and act in accordance with them. Therefore, access to legal information and the availability of legal data are crucial for legal certainty, the conduct of legal and natural persons, and mutual legal relations. Additionally, several thousand legal acts and regulations are enacted annually by governments and local authorities. On a daily basis, courts issue court rulings, and administrative bodies make administrative decisions. Due to advances in the digital age and the Open Data movement, the number of legal documents published online is growing exponentially as a direct consequence of advances in information technology and digitalization (Virkar et al., 2020). Still, the availability of legal documents to everyone has often not kept pace with this growth rate (van Opijnen & Santos, 2017). Nowadays, the ability to quickly and easily find legal data and relevant documents necessary to build a legal case or to remain informed about a specific legal topic is crucial for legal professionals (Alexopoulos et al., 2021). Technical openness,

through the use of machine-readable formats, and legal openness, through the use of clearly defined open licenses, are key criteria that enable the reuse of published legal documents (Zdjelar et al., 2020). The potential of legal data and its reusability is particularly significant, as it can enhance presentation, accessibility, understanding, and the creation of added value.

Thus, the focus of this paper is on legislative portals as a specific type of open data portal that publishes and makes available legal information and data in machine-readable formats without restrictions on their (re)use. Here, legislative portals will serve as an example to look more closely into the governance of open data portals and the availability and quality of open data. Open data research and practice acknowledge the relevance of appropriate governance structures, policies, mechanisms, and processes. In addition, the effective development of open data portals requires governance to coordinate activities and contributions of different stakeholders (Vancouwenberghe & Cromptvoets, 2018). At the same time, the value of such governance efforts depends on data being genuinely open, meaning that the data are available as a whole, downloadable from the Internet at no cost, and can be freely used and reused (van Loenen et al., 2018). In this context, the primary audience targeted and observed comprises individuals who work with legal data, including legal professionals, legal researchers and scholars, and practitioners.

The main research questions addressed here are: what are the main features of governance of legislative portals, in terms of key policy aspects, organization, and legal frameworks, and to what extent open data is available on the legislative portals. To address these questions, the paper will (1) develop an assessment tool applicable to legislative portals based on the existing open data assessment theory and models and (2) present and analyze the existing policy and governance structures in the selected countries. The developed assessment tool will then be applied to the legislative portals of three countries - Croatia, Slovenia, and France - chosen as case studies. As a result of using the assessment tool, the research aims to identify similarities and differences among the evaluated legislative portals, recognize issues that prevent the effective use and reuse of legal data, and, consequently, propose a set of related recommendations to address the detected issues.

Despite the significance of legal data as a specific type of open data, relatively limited attention has so far been paid to legislative portals that publish legal data. Currently, there is no widely established assessment tool specifically tailored for evaluating open data published through legislative portals. Therefore, the paper attempts to fill this research gap and contribute to the literature on open data portals, governance, and availability of open data from the perspective of legislative portals. In addition, the developed assessment tool is intended to be applicable

beyond the scope of this paper, thereby offering potential value for future research and practical evaluations of legislative portals across different jurisdictions.

This research paper is structured as follows. The introduction is followed by a section reviewing relevant open data literature and discussing the concept, definition, benefits of open data, and key aspects of open data. Next, an overview of the European Union legal framework for open data is presented. The following section explains legal information and data, and legislative portals, which constitute the primary focus of this paper. Next, common methods for assessing open data are presented, followed by an investigation of the literature about open data assessment models. Methodology and assessment framework development are introduced in the next section. The following section describes the application of the developed assessment framework tool against selected legislative portals in three countries - Croatia, Slovenia, and France. Discussion is presented in section six. Finally, section seven presents the conclusions drawn and provides recommendations derived from this research.

2. Open data - unlocking transformative opportunities

Data increasingly determines, directs, and shapes the way people live today (van Loenen et al., 2018). Data plays a significant role in all human activities and has become the most valuable resource of the digital age, similar to oil during the industrial age. Both oil and data require a high degree of skill to extract benefits from unprocessed and raw materials. Like oil, raw data by itself has limited utility. It needs to be refined, processed, and strategically used to drive the engine of change. However, unlike oil, data does not cease to exist once used. The difference is that data grows in value and reusability while oil gets consumed. The rapid increase in data has led to the contention that "*data is the new oil*," a quote dating back to 2006, credited to mathematician Clive Humby. Today, data is not an output or by-product but rather a power that offers society a possibility to drive tremendous political, economic, and social change (Jetzek et al., 2012; Charalabidis et al., 2018). Even the world economy has turned into a data-centric one, aiming to extract maximum benefits from data (Máchová & Lněnička, 2017). However, the opening of data by governments and public organizations has only recently occurred. Only in recent years has the public sector begun to make its data openly available on the web for unrestricted use and reuse (Charalabidis et al., 2018).

The normative foundations of open data policies were initially established in the United States. The early development of open data policies in the United States can be traced to federal (executive branch) initiatives that predate the contemporary open government data movement (Tauberer, 2014). Long before open data was formally articulated as a policy objective, U.S. administrations emphasized public access to government information as a core democratic principle. A key milestone in this respect was Circular A-130¹, issued during the Clinton administration in 1994. This document underscored the importance of ensuring public access to government information as an essential element of democratic governance, thereby laying an important conceptual foundation for subsequent open data initiatives (Charalabidis et al., 2018).

Building on these early open data foundations, the United States took a more explicit and operational approach to open data with the issuance of the Open Government Directive in 2009. This Directive² marked a shift to concrete implementation requirements, obliging federal agencies to immediately adopt the principles of transparency, participation, and collaboration (Charalabidis et al., 2018). In addition, the Directive required federal agencies to publish

¹ Circular A-130 available on https://obamawhitehouse.archives.gov/omb/circulars_a130/

² Open Government Directive available on <https://obamawhitehouse.archives.gov/open/documents/open-government-directive/>

information online in open formats that enable data to be retrieved, downloaded, indexed, and searched using commonly available web search tools. It mandated the proactive release of high-value datasets, the establishment of agency-level Open Government websites, and the development of mechanisms for public engagement.

As a concrete outcome of these requirements, the U.S. government launched Data.gov in 2009 as the official portal for federal open data. Created under the Open Government Directive, the portal initially provided access to 47 datasets and served as a centralized platform for implementing the directive's mandates on proactive disclosure, standardized formats, and public accessibility.

In contrast, the origins of open data initiatives in the European Union reflect the recognition of public sector information (PSI) as a critical resource for the development of the information society and digital content markets. Economic considerations and the potential value of PSI for innovation and market growth strongly influenced the European approach. A key milestone in this development was the 1998 European Commission Green Paper, *Public Sector Information: A Key Resource for Europe*, which highlighted disparities in national access and reuse practices and called for harmonized rules to unlock PSI's economic potential, stimulate innovation, and support the internal market without undermining public sector operations.

Building on these findings, the European Commission made the Proposal for a Directive of the European Parliament and of the Council on the reuse and commercial exploitation of public sector documents (COM (2002) 207), aiming for minimum harmonization to ensure fair, proportionate, and non-discriminatory reuse conditions while respecting member states' existing access regimes. The proposed directive highlighted that PSI could provide essential raw materials for commercially viable digital products, with reuse offering significant economic potential, though this potential was limited by fragmented national frameworks. Negotiations addressed concerns regarding resource burdens and intellectual property rights, resulting in provisions that permitted charges to cover only marginal costs and restricted exclusive arrangements.

Since then, open data has become a popular topic, and open data initiatives have focused on making all non-personal and non-commercial data available, especially (but not exclusively) data collected and processed by government or government-controlled entities (Braunschweig et al., 2012). Further, many governments worldwide have started implementing open data initiatives and opening their data (Máchová & Lnénicka, 2017; Vrček, 2015) to increase the

transparency of public services and to attract and encourage citizens to participate in policy decision-making processes (Kapoor et al., 2015).

2.1. Open data - concepts, definitions, principles, and benefits

The open data concept emerged amid a growing emphasis on transparency, democratic participation, efficiency, and innovation across society (Giannopoulou, 2018). The concept of open data encompasses data that is freely available for the common good and can be accessed, used, modified, shared, and reused by anyone for any purpose, without any barrier for any (re)user (Braunschweig et al., 2012; van Loenen et al., 2018). Additionally, the idea of open data reuse rests on the premise that all citizens jointly own public-sector information, given that data is collected and produced by public authorities within their competence and responsibilities, and funded by public funds (Zdjelar et al., 2020). The principle of open data is that the data is funded by public money (Janssen et al., 2012), thus making citizens and companies the owners of the data. Also, unless limited by intellectual property rights, personal data protection, or business secrets, the innovative (re)use of data should be made possible for citizens and businesses to create added value and realize gains in the market (Musa et al., 2018; van Loenen et al., 2018).

The Open Definition makes the meaning of "open" precise and lays out principles that define "openness" concerning data and content. According to the Open Definition, the most widely cited and accepted definition available, open data can be explained as data that "anyone can freely access, use, modify, and share for any purpose (subject, at most, to requirements that preserve provenance and openness)".³ Availability and access, (re)use and redistribution, and universal participation are key features of open data⁴. Janssen et al. (2012) define open data as non-privacy-restricted, non-confidential data created with public funds and made available without any restrictions on its use or distribution. Kitsios et al. (2017) argue that open data are identified as the data that should be available to everyone, with the possibility of reuse without copyright limitations. In line with the idea of open data, data should be available to anyone, for

³ "Open Definition 2.1". <http://opendefinition.org/od/2.1/en/> visited 12/12/2025

⁴ "The key features of openness are:

- Availability and access: the data must be available as a whole and at no more than a reasonable reproduction cost, preferably by downloading over the internet. The data must also be available in a convenient and modifiable form.
- Reuse and redistribution: the data must be provided under terms that permit reuse and redistribution, including the intermixing with other datasets. The data must be machine-readable.
- Universal participation: everyone must be able to use, reuse, and redistribute — there should be no discrimination against fields of endeavors or against persons or groups."

What is open? <https://okfn.org/opendata/> visited 12/12/2025

any purpose, in a machine-readable, non-proprietary format, based on open standards and digestible by open-source software, and available free of charge (van Loenen et al., 2018). Open data is data that can be accessed and (re)used without any limitation for any type of reuse, and a dataset must be either in the public domain or distributed through an open license (Dalla Corte, 2020). Reuse of public sector information implies the use of data collected, maintained, or produced by public organizations by individuals and legal persons for commercial or non-commercial purposes for which these data are not primarily intended (Zdjelar et al, 2020; Musa et al., 2018). Private, confidential, and classified data are excluded, as this type of data is inappropriate for public dissemination (Janssen et al., 2012).

Table 1: *Summary of the key characteristics of open data*

Key Characteristic	Description
Free access	Data can be accessed by anyone.
Free use and reuse	Data can be used and reused for any purpose, including commercial and non-commercial.
Universal participation	No discrimination against persons, groups, or fields of endeavor; everyone must be able to use and reuse.
Modification allowed	Users are permitted to modify, adapt, and build upon the data.
Free redistribution	Data can be shared and redistributed without restrictions.
Open licensing /public domain	Data must be in the public domain or released under an open license that permits reuse.
Machine-readable format	Data should be provided in formats that can be automatically processed.
Non-proprietary formats	Data should be based on open standards and not tied to proprietary software.
Free of charge	Data should be available at no cost.

Source: Author based on "Open Definition 2.1."

Further, a specific and relatively large class of open data is open government data (OGD) (Jetzek et al., 2012). Open government data is not equivalent to open data but is a subcategory of open data (Máchová & Lněnička, 2017). Government or government-controlled agencies produce and commission vast quantities of data (government data). Although government data is frequently collected or created for particular purposes, creating substantial risks for validity, relevance, and trust if taken out of that context (Jetzek et al., 2012), open data has become the default setting for government data releases. These data can facilitate the development of new digital products, create new jobs, increase value creation, and contribute to a better, more prosperous society. However, said data must be public - it must not be subject to valid privacy, security, or other legitimate and legally sanctioned restrictions (Dalla Corte, 2020). Thus,

countries committed to transparent, accountable, and collaborative governance widely recognize the need for open government data (Miletić et al., 2023; Musa et al., 2020). However, since governments are the primary source of freely available data, the term open data is usually used in relation to open government data (Zdjelar et al, 2020).

Open data should comply with the ten principles formulated in 2010 (Sunlight Foundation, 2010). According to these Open Data principles, which are essential for understanding the concept of open data, data must be: complete; primary; timely; accessible; machine-readable; non-discriminatory (allowing diverse groups with different interests to take advantage of this data); non-proprietary; permanent, license-free, and preferably free of charge (van Loenen et al., 2018). The main requirements that need to be fulfilled to qualify data as open data can be described as the following: 1. availability, access, and usability; 2. no limitations for reuse, modification, and redistribution; 3. broad participation and non-discrimination; 4. full machine processability and interoperability; 5. based on open standards, formats, and license-free; and 6. free of charge (Dalla Corte, 2020). Most of the data will not meet all these essential requirements. Nevertheless, data is only genuinely open if most of these requirements are met (Charalabidis et al., 2018; van Loenen et al., 2018).

Additionally, the Open Data Charter (Castro and Korte, 2015) signed by G8 member countries in 2013 recognizes the vital role of open data in fostering innovation and promoting government transparency and determines five main principles concerning open data (Musa, 2015, van Loenen et al., 2018) according to which public administration should: (1) release all public information in an open and machine-readable format unless there is a legitimate reason for non-disclosure, such as national security and privacy concerns (principle - release open data by default), (2) ensure the broad range of data sets and their appropriate quality, in terms of timeliness, accuracy, and clarity of language (principle - high quality and quantity of data), (3) standardize metadata for all data sets, use open (standard) licenses, and ensure general availability of data (principle - data usable by all), (4) share best practice on open data at international level, publish certain key data sets and collaborate with civil society (principle - publishing data to improve governance), and (5) make available data sets that are considered high value data and involve individuals and groups and fund open data startups (principle - release data for innovation) (Musa, 2015; Charalabidis et al., 2018).

The opening and use of data offer numerous benefits and encourage new insights to enhance business activities or drive innovation (Kop, 2020). Open data has a significant impact in four main areas: improving government, empowering citizens, creating opportunity, and solving problems (Charalabidis et al., 2018), and it encompasses the economic, social, environmental,

and political benefits gained from open data use. Open data leads to a more responsive and transparent government and better services for citizens, industry, research, and others (Musa et al., 2020). Open data enrich research and apprise decision-making, transforming into better products and services that improve everyday life and increase productivity, well-being, health, and safety (Huyer et al., 2020). However, transparency is widely regarded as a key benefit of open data. Governments worldwide acknowledge the importance of open data and its role in increasing public trust and transparency, and strengthening human rights and democracy (Musa et al., 2020). Open data also contributes to social benefits for the government and the public, enabling dialogue on important social issues (Cranefield et al., 2014). Since governments are keen to leverage their data to support an uptick in economic activity, opening up more government data has the potential to significantly increase economic value by making open data accessible to those who need it at minimal cost. Moreover, citizens and businesses are coming up with a plethora of useful and practical applications as more datasets become available at marginal cost (Charalabidis et al., 2018).



Figure 1: *Key benefits of open data*

Source: Author based on Charalabidis et al., 2018.

2.2. Open data – key aspects

Since the beginning of the open data movement, thousands of public datasets have been released and made available to the public. The momentum towards open data initiatives continues to grow globally, driven by advances in digital networking and strengthened through international cooperation. The number of governments expressing interest in opening their data to the public is increasing, mainly due to legal requirements (Zdjelar et al, 2020; Musa et al., 2020). Simply providing data does not automatically increase its (re)use or generate public value per se; aligning data with actual needs and users and matching demand and supply of data are essential (Calzati & van Loenen, 2025). To facilitate a better understanding of the publication and (re)use of open data, this chapter outlines the key aspects governing the release of open data.

2.2.1. Open data policy and open data governance

The data revolution is not just about opening up data. It is about creating and setting up a suitable open data framework that makes data available, easily accessible, and reusable. That implies developing and establishing an open data policy to address the diversity of data providers, data formats, and tools, to guide government data publication, and to gain benefits from open data (re)use (Charalabidis et al., 2018).

An *open data policy* consists of the development of specific rules and strategies to foster open data practices and culture across government. An open data policy deals with processes, activities, and decisions that tackle particular issues and aim to achieve a specific impact on society (Charalabidis et al., 2018). Requirements to put an adequate open data policy in place are: develop clear plans to set the policy into practice by defining processes, responsibilities, timelines, resources, and a national authority in charge of execution; establish guidelines and formal procedures with standardized methods for the publication and update of datasets; provide financial resources, human resources, and support. An adequate open data policy serves two groups: (1) governments and other public organizations, and (2) citizens and other data consumers. Each group gains different benefits from the open data policy. For public organizations, the policy spells out guidance, instructions, requirements, and tools for implementing open data. For user groups, an open data policy clearly defines which data are made public, how and where to access data, standards for providing data, and how to engage with the government and public organizations (Charalabidis et al., 2018; Musa et al., 2020).

The open data policy examines countries' strategies for open data, the national governance models for managing open data, and the measures applied to implement these policies and strategies (Capgemini Invent, 2025). The open data policy's goals are to stimulate reuse, both from the perspective of open data publishers and open data users. The open data policy guides data publishers on preparing the data according to what data users need (Nugroho et al., 2015). The expected positive impacts of open data policies include increasing participation by open data users, stimulating economic growth and innovation, enhancing transparency, and realizing many other benefits (Charalabidis et al., 2018). Thus, Charalabidis et al. (2018) argue that open data policies should focus not only on opening data but also on improving the use of and value creation. An open data policy and strategy must be in place at the national level to provide a long-term strategic vision and action plan for open data.

On the other hand, *governance* is a framework of policies, rules, processes, and instruments through which interactions between parties are directed and managed to achieve parties'

common goals (Welle Donker & van Loenen, 2017). Open data governance can be defined as the interplay of rules, standards, tools, principles, processes, and decisions that shape what government data is made available, how data is published, and by whom (Brandusescu et al., 2019).

Open data governance includes the structures, processes, and procedures that public organizations utilize to manage, use, and protect their data. The mentioned help define the actions to be taken, the processes to be followed, and the technology that supports them throughout the data lifecycle (Graux, 2024). Open data governance is also about the policies, decision-making processes, and tools used to improve how governments create and use open data across departments. In addition, open data governance structures can take many forms, and countries take various approaches when developing their open data governance. Countries develop different models to govern their open data activities. Open data governance is essential to facilitate the use of open data (Welle Donker & van Loenen, 2017).

A key aspect of open data governance relates to defining data control mechanisms and data usage rights. Open data governance establishes the approach of how governance aspects are arranged (Welle Donker & van Loenen, 2017). The effective implementation of open data initiatives also requires open data governance to avoid gaps, duplications, contradictions, and missed opportunities (Vancauwenberghe & Cromptvoets, 2018).

Additionally, governance that seeks to regulate a data ecosystem fairly defines roles and rules that represent the data interests of all actors, along with mechanisms to resolve situations in which conflicts among actors and/or values may arise (Calzati & van Loenen, 2025). Governments are expected to develop an appropriate governance structure to coordinate activities (Capgemini Invent, 2020), ensure open data publication at all government levels, and enable the participation of diverse open data stakeholders (Vancauwenberghe & Cromptvoets, 2018). Zygmuntowski et al. (2021) have hinted at the promise of designing a comprehensive European Union commons-based data governance. However, governments face many challenges and impediments in their efforts to define an effective governance model. Publishing open data is complex, as it requires consistent political commitment, appropriate organizational structures and resources, and technical competence within public organizations (Susha et al., 2015; Vrček, 2015).

Often, not enough time is spent on assessing how open data itself is governed, such as who is tasked within governments to make data open. Also, it is still unclear whether the principles and practices that guide government opening - such as transparency, accountability, and user-

centrism - also guide decision-making on how to release open data (Brandusescu et al., 2019). Some organizations do not publish high-value data because they lack the knowledge on how to adapt sensitive data for publication (Welle Donker & van Loenen, 2017). At the same time, data governance has become more complex. Public organizations face many issues and concerns when opening and publishing their data (Vrček, 2015), including the lack of standard procedures, the risk of privacy violations when releasing data (Katulić et al., 2022), the risk of data misuse, and issues related to data ownership (Charalabidis et al., 2018).

Table 2: *Key takeaways that clearly distinguish open data policy from open data governance*

Dimension	Open Data Policy	Open Data Governance
Purpose	Provides a strategic vision and formal commitment to open data, with a focus on enabling access, reuse, and value creation.	Provides the operational and institutional framework that governs the implementation of open data decisions.
Focus	Defines what data should be opened, why, and for whom, emphasizing societal and economic impact.	Defines how, by whom, and under what rules data is opened, managed, and controlled across the data lifecycle.
Scope	National-level strategies, action plans, rules, and guidelines for publishing and reusing data.	Structures, processes, standards, and decision-making mechanisms across government levels and actors.
Key Components	Clear implementation plan and standardized publication procedures.	Roles and responsibilities, coordination mechanisms, data control and usage rights, and conflict-resolution mechanisms among actors.
Primary Stakeholders	Governments/public organizations and data users (citizens and businesses).	Government actors, data publishers, intermediaries, users, and other data stakeholders.
Relationship to Each Other	Sets the direction and objectives for open data initiatives.	Translates policy goals into actionable, coordinated, and sustainable practices.

Source: Author based on Charalabidis et al., 2018; Musa, 2015; Welle Donker & van Loenen, 2017.

For example, the European data strategy, through its open data policy, seeks to make information - particularly that held by public sector organizations - as freely available and reusable as possible for any purpose. This approach has helped foster the development of open data ecosystems, understood as networks of public administrations, businesses, and data re-users that work together to expand the availability and use of datasets (Graux, 2024). These ecosystems usually rely on simple data-governance arrangements: when data is openly available, it should be as freely accessible as possible - whether that means downloading it from open-data portals or accessing it through open APIs. In contrast, complex governance frameworks that introduce detailed requirements tend to conflict with the core purpose of open data: the more obstacles users must navigate, the less open the data effectively becomes.

This paper will examine more closely the specific indicators related to the appropriate governance structures, policies, mechanisms, and processes. To that end, this paper will discuss specific indicators previously established in the literature on common methods for assessing open data governance.

2.2.2. Open data portals

The launch of various open data portals has taken place due to the release of government data by public organizations, which is seen as a significant step toward a digital society (Máchová & Lnénicka, 2017). Additionally, a prerequisite for unlocking the potential of open data is the ability to quickly discover relevant data (Charalabidis et al., 2018; Máchová & Lnénicka, 2017). An *open data portal* is a website or web page that contains data from various sources, organized into categories to make it easier for any user to access data. Therefore, open data portals are considered a solution to solve the problem of data discoverability, accessibility, and reusability (Kutnjak et al., 2021).

Open data portals are vital tools that people rely on to find and use open data (Kutnjak et al., 2021). The open data portal's goal is to make open data more widely available and easier to locate, enabling the development of more services that benefit citizens (Capgemini Invent, 2020). These portals are crucial because they connect data providers and holders with data users, who create services that benefit individuals and businesses. Moreover, by publishing data on open data portals, governments are giving it back to citizens, who have indirectly funded data's creation through taxes (Máchová & Lnénicka, 2017).

In the last few years, an increasing number of countries have established open data portals to provide access to open government data to a broad audience for further reuse (Nikiforova & McBride, 2021). Typical examples are national open data portals (Zuiderwijk et al., 2013). National open data portals are developed as specialized websites where a publishing interface enables data to be uploaded and furnished with high-quality metadata and organized into a searchable record (Máchová & Lnénicka, 2017).

Open data portals are web-based interfaces designed to make it easier to find reusable information and are intended to improve the reuse of open data and exploit its potential. Open data portals usually publish information about data on user-friendly dashboards that users can view, download, and access via an Application Programming Interface (API) (Charalabidis et al., 2018; Máchová & Lnénicka, 2017). These datasets are organized into a searchable catalog, and users can search for or browse relevant data by category, tag, or format (Máchová

& Lněnička, 2017). The actual dataset is not considered part of the catalog record. The catalog record usually includes a download link to the website from where the actual dataset can be obtained (Máchová & Lněnička, 2017). The catalog is operated by a catalog operator, typically a government agency.

Table 3: Summary of the key characteristics of open data portals

Key Characteristic	Explanation
Purpose	Facilitate the discovery, accessibility, and reusability of open data.
Centralized access	Provides a single-entry point to datasets from multiple sources.
Data discoverability	Supports searching and browsing through catalogs, categories, tags, and formats.
Data Accessibility	Enables users to view, download, and access data via APIs.
Metadata-driven	Uses high-quality metadata to describe and organize datasets.
Reusability support	Facilitates the reuse of open government data for new services and applications.
User-friendly interface	Offers dashboards and web-based tools for easy interaction.
Stakeholder connection	Bridges data providers and data users.
Government governance	Usually managed by public authorities or government agencies.
Public value creation	Supports transparency, innovation, and citizen-oriented services.

Source: Author based on Charalabidis et al., 2018; Máchová & Lněnička, 2017.

Timeliness, usability, comparability, and interoperability are essential requirements for high-quality data. To publish data with these attributes, governments need to invest in the portal's infrastructure, including hardware and software tools. In addition, Máchová & Lněnička (2017) explain the presence of various approaches for publishing open government data. They identify three essential approaches: (a) user-centered, which makes data understandable and accessible to citizens without technical background; (b) stewardship, which is defined by many desirable characteristics to assure data accuracy, validity, and related qualities; and (c) reuser centered, which emphasized the importance to provide the data in a machine-readable format and fulfill other aspects related to data quality (Máchová & Lněnička, 2017).

Therefore, to best serve public needs, portals are expected to offer high-quality services and be user-friendly, allowing any stakeholder to access the data and provide reusable data (Máchová & Lněnička, 2017). In that regard, it is crucial that the data is made available and

adequately published through the open data portal since the value of data lies in reuse (van Loenen et al., 2018).

Furthermore, open data portals are a crucial part of most open data initiatives. Today, nearly all European countries have an open data portal. These portals are evolving over time and becoming more advanced. They are being used more frequently and creating more benefits for citizens. In its report, Capgemini Invent (2020) defines a sustainable open data portal as one that efficiently addresses diverse challenges and has the governance, finance, architecture, and operational models to do so. While providing easy access to published data, open data portals can also catalyze publishing more and higher-quality data.

The launch of the European Data Portal in 2015 was the next important step in the development of open data in Europe. The European Data Portal connects the open data portals of all European Union member states, as well as the European Union itself (Charalabidis et al., 2018; Musa, 2019). It harvests metadata from the publication of open data in national, regional, and local portals across the European Union. Through the European Data Portal, data is made available to users concerning a variety of themes: administration, culture, economy, finance, housing, international, agriculture, migration, environment, education and science, health, etc. Privacy-sensitive data and other sensitive data that are inappropriate for opening remain closed (Katulić et al., 2022).

Most open data portals have emerged to support accessing and making available different types of open data without restrictions on their reuse; legislative portals extend this goal by making legal information and data openly available. Thus, this paper will look more closely into the specific indicators related to the governance of legislative portals as a specific type of open data portal to determine whether the governance models are in place to ensure open data publication and policies regarding licensing, up-to-dateness, and provenance. The paper will also consider the link between the features and functionalities of legislative portals and legislative portal usability. To this end, the paper will examine indicators previously established in the literature on common methods for open data portal assessment and examine how these indicators can be adapted for evaluating legislative portals.

In particular, it will focus on a dimension that assesses coverage and the functionalities and features of legislative portals that facilitate user access to datasets and the downloading of open data. This dimension examines the breadth and diversity of open data made available across different domains. It also includes monitoring portal performance and implementing measures to enhance the searchability and discoverability of data, along with ensuring that

metadata is presented in clear, plain language to support comprehension by both human users and machine-based systems.

2.2.3. Open data quality

Recent trends in digitalization and open data have led to an exponential increase in the amount of data available to citizens (Charalabidis et al., 2018). However, published data is often fragmented and provided in various formats by different data providers. In many portals, data are open but not well-described, making it difficult to search for specific data (Charalabidis et al., 2018). Also, research shows that many datasets published online under the open data label are often not reusable in reality (van Loenen et al., 2018).

Therefore, the quality of published data is crucial, as the public needs accurate, timely information to make better decisions and gain maximum benefits from open data. Data quality is usually described in the literature by a series of quality dimensions (Máchová & Lněnička, 2017), and it is a measure of data condition based on common factors such as accuracy, completeness, consistency, reliability, and timeliness. Nikiforova (2020) explains that data must be available, accurate, timely, complete, consistent with other sources, relevant, comprehensive, etc., but emphasizes that the dimensions that characterize data quality are highly diverse.

Often, a definition of data quality is provided to explore further and clarify the meaning of machine processability (Tauberer, 2014). Also, data quality assesses whether information can serve its purpose in a particular context, and it might be understood within the context of data's intended use (Kučera et al., 2015). Nikiforova (2020) also emphasizes that data quality is reflected in specific data use and reuse. However, although the concept of quality is cross-disciplinary, there is no single agreed-upon definition of data quality (Kučera et al., 2015).

The preferred way to make data available for reuse is open data (Nikiforova, 2020). Musa (2015) and van Loenen et al. (2018) explain that data quality is an essential aspect of data reuse, which requires that data be provided and made available in a form suitable for further use: in an open, machine-readable format and in accordance with the open data standard. The reuse of data is most easily achieved through open data published on public organizations' websites or portals together with metadata - data that explains the content of the dataset (Charalabidis et al., 2018; Musa, 2015).

Open data must be freely accessed, used, modified, and shared by anyone for any purpose. Also, data must be available as a whole, free of charge, and downloadable, including any information necessary to comply with the open license's terms (van Loenen et al., 2018). They should be available in machine-readable and bulk form to be processed by a computer and accessed and modified for each individual data element. Data is available in bulk, allowing users to download a complete dataset (Marković et al., 2016). Data should be provided in an open format that can be processed with at least one open-source tool (Charalabidis et al., 2018; Musa, 2015). The datasets should be complete, not contain errors, and regularly updated and modified to ensure quality and accuracy (Hysenllari, 2020; van Loenen et al., 2018). Furthermore, it is of high importance for data reuse to make raw data and datasets available in certain formats and with specific technical characteristics and features, allowing users to draw their own conclusions about the data (Máchová & Lněnička, 2017; Musa, 2015).

Tim Berners-Lee developed a five-star deployment scheme⁵ for open data. A five-star open data plan is used to determine one of several aspects of the data's technical quality. One star indicates that the data is available on the Internet (whatever format) under an open license. Two stars indicate that the data is available in a structured form (e.g., in an Excel spreadsheet). Three stars indicate that the data is available in a non-proprietary, open format (e.g., CSV rather than Excel). Three stars are considered the minimum standard for open data quality. Four stars indicate that the data was published using RDF, in which data elements use URIs (Uniform Resource Identifiers) so that other users can access them directly. Five stars indicate that the data is linked with other data to provide context and give a broader picture (Máchová & Lněnička, 2017; Musa, 2015).

Thus, the technical quality of data and metadata is a crucial aspect for its reuse. When the quality of the data is poor and quality issues are frequent, this can prevent citizens and businesses from reusing the data (van Loenen et al., 2018). Therefore, the entire data life cycle is important - from the collection, maintenance, versioning, and publication of open data, which appropriate business processes should accompany and support (Musa, 2015; van Loenen et al., 2018). Also, data quality can be improved by establishing standards for the collection and publication of open data (Berends et al., 2020).

⁵ a 5-star deployment scheme for Open Data <https://5stardata.info/en/> visited 20/12/2025

Table 4: *Key points on data quality for open data reuse*

Theme	Key Points
Data quality dimensions	Data quality is commonly described through dimensions such as accuracy, completeness, consistency, reliability, timeliness, relevance, availability, and compliance with standards.
Open data and reuse	Open data requires machine-readable formats, open standards, and appropriate licensing - overall quality of data publication and presentation on the portal.
Role of metadata	Metadata is essential for understanding, searching, and re-using datasets, as it explains dataset content and structure.
Technical requirements	Open data should be freely accessible, downloadable in bulk, machine-readable, non-proprietary, and processable using open-source tools.
Standards and interoperability	The use of common data standards, shared data models, RDF, URIs, and interlinking with other datasets.
Data lifecycle management	Data quality must be ensured throughout the entire data lifecycle, including collection, maintenance, versioning, and publication.

Source: Author based on Máchová & Lněnička, 2017; Musa, 2015; Welle Donker & van Loenen, 2017.

Thus, this paper will examine specific indicators related to the quality of published open data to determine whether the data is made available in a format acceptable for further reuse in accordance with the open data standard. Also, the paper will assess the availability of data (technical and legal openness). In order to do that, this paper will examine specific indicators established previously in the literature on common methods for assessing the quality of open data.

2.2.4. Legal openness - open data licensing and what it means in practice

Publishing data online does not mean that data can be used or reused freely without restrictions. There are many different layers of rights that can grant legal protection to data (Giannopoulou et al., 2018). There are two common types of intellectual property rights that an author-creator is automatically given over works he has created: copyright over works (content) or a database right over collections of data. In addition, the Directive on the legal protection of databases (Directive 96/9/EC) introduced a new intellectual property right under Article 7. It is not a copyright but a *sui generis* right since it does not fit into any existing intellectual property rights categories (Giannopoulou et al., 2018). Article 7(1) of Directive 96/9/EC prescribes an extra layer of protection to a database's creator in the form of the exclusive right to "prevent extraction and/or re-utilization of the whole or of a substantial part, evaluated qualitatively and/or quantitatively, of the contents of that database." This *sui generis*

database right prevents copying and reusing of substantial parts of a database. In addition, database rights protect the maker's investment and not their originality.

According to the Open Definition, open data is data that "can be freely accessed, used, modified, and shared by anyone for any purpose - subject, at most, to requirements that preserve provenance and openness." The main requirements for open data are twofold: data and openness (van Loenen et al., 2018). There are many aspects to openness, but data must fulfill two conditions to be legally and technically open. Data is legally open if an appropriate license permits anyone to freely access, modify, transfer, link, and reuse data. A license is a contract by which a data owner grants a data user the right to use specific works protected by intellectual property rights. Through a license, one person explicitly grants another person permission to use a specific work and determines the legal conditions under which the work is provided (Dalla Corte, 2020).

There are two types of licenses: (1) an exclusive license, where one single user has an exclusive right to use the object, and (2) a common license, where all users have the same right to use the object. If there is no license agreement, the default is copyright law. If data are published without a license agreement, a copyright holder reserves all rights provided by copyright and related law. Open data exploits intellectual property over data to develop and establish a set of licensing requirements that make it accessible and usable by anyone and for any purpose (Dalla Corte, 2020).

Thus, it is crucial how data is licensed. Data must be either license-free or have an open license to be considered open data. Data is license-free when it is not subject to any copyright, patent, trademark, or trade secret regulations, except when reasonable privacy, security, and privilege restrictions exist (Marković et al., 2016).

An open license imposes very few restrictions on what someone can do with data that is being licensed and allows users to do the following: republish data on their website, derive new content or data from existing data, make money by selling products based on the (re)use of published data, or republish data while charging an access fee (Dodds, 2013). Under an open license, only two types of restrictions can be imposed: (1) reusers must give credits to the author-creator (known as attribution), and (2) reusers must publish any derived data under the same license (known as share-alike). Thus, a licensor may choose that data can be made available under one of three levels of an open license: a public domain license (no restrictions at all), an attribution license (reusers must give attribution to the author), or an attribution and share-alike license (reusers must give attribution and share any derived data under the same

license) (Dodds, 2013). The term public domain denotes the absence of copyright and similar rights, either by default or through an explicit waiver of all such rights.

Table 5: *Three levels of an open license should be considered when publishing open content*

Level of License	Creative Commons License
public domain	CC0
attribution	CC-by
attribution & share-alike	CC-by-sa

Source: Dodds, 2013.

Creative content, such as text, pictures, slides, and similar, is expected to be licensed using a Creative Commons License⁶. In addition, a Creative Commons license can be used to license databases - subject to copyright and, where applicable, sui generis database rights established by Directive 96/9/EC.

Creative Commons licenses provide a standard set of terms and conditions that authors, creators, and other rights holders may use to share the author's original works and other material subject to copyright. By using one of the Creative Commons licenses, a licensor grants the public permission to use the licensed material under specified terms and conditions. Hence, it is important to note that the fundamental purpose of these Creative Commons licenses is to make licensed works available to the broadest range of users on the Internet in an open model (Katulić, 2018).

Each Creative Commons license is valid worldwide and for as long as the copyright and related rights last. All licenses have several standard characteristics: to allow non-commercial copying and distribution while preserving copyright; to ensure that authors-creators receive the recognition they deserve for their work; to use the license internationally (Katulić, 2018).

However, licensors may choose to impose some additional conditions: attribution (credits must be given to the creator), share-alike (same license terms apply as for the original work), non-commercial (only for non-commercial purposes), and no derivative (only original non-modified work may be distributed) (Marković et al., 2016). Thus, by exercising the freedom of contract, licensors can grant reusers sufficient permissions to use their creative work while ensuring that the data remains accessible, distributable, and reusable by anyone for any purpose (Dalla Corte, 2020).

⁶ About CC Licenses <https://creativecommons.org/share-your-work/cclicenses/> visited 12/12/2025

Creative Commons licenses include three layers: legal layer (a layer written in the legal language), commons deed (a layer written in language any user can understand), and machine-readable version (a layer that enables software to understand license terms) (Marković et al., 2016). In addition, a set of Creative Commons license agreements consists of six basic license agreements, produced by combining four different types of permissions. These are, in order from the most restrictive to the most liberal (Katulić, 2018):

- 1) Attribution-Non-Commercial-NoDerivatives (CC BY-NC-ND) is the most restrictive of the six Creative Commons licenses. It allows others to use someone's work and share it with others for non-commercial purposes under the requirement of crediting the author, with a ban on modifying the work or using it for commercial purposes,
- (2) Attribution-Noncommercial-Share Alike (CC BY-NC-SA) lets others remix, adapt, and build upon the author's work non-commercially, as long as the author is credited and license their new creations under the same conditions as the original work,
- (3) Attribution-Non-Commercial (CC BY-NC) lets others remix, modify, adapt, and build upon the author's work non-commercially, and although a new work must also acknowledge the author and be non-commercial, they do not have to license their derivative works under the same conditions as the original work,
- (4) Attribution-NoDerivatives (CC BY-ND) lets others reuse the work for any purpose, including commercially; however, with the prohibition of derivative works, and credits must be provided to the author,
- (5) Attribution-ShareAlike (CC BY-SA) lets others remix, adapt, and build upon the author's work even for commercial purposes, as long as they credit the author and license their new creations under the same terms as the original work, and
- (6) Attribution (CC BY) is the least restrictive of all Creative Commons licenses. This license lets others distribute, remix, adapt, and build upon the author's work, even commercially, as long as they credit the author for the original creation. This license is recommended for maximum dissemination and use of licensed materials.

In addition to these licenses, the Public Domain Dedication tool (CC0) was created, allowing copyright holders to dedicate their work to the public domain, effectively waiving all copyright and related rights.

License	License Symbols	Permissions Granted
Attribution (BY)		Attribution (BY): Others can copy, distribute, display, perform and remix the work if they credit/cite the creator/author.
Non-Commercial (NC)		Non-Commercial (NC): Others can copy, distribute, display, perform or remix the work but only for non-commercial purposes.
No Derivatives (ND)		No Derivative Works (ND): Users can only copy, distribute, display or perform verbatim copies of the work. (No modifications allowed.)
Share Alike (SA)		Share Alike (SA): Others can distribute the work only under a license identical to the one attached to the original work
Public Domain Dedication (CC0)		Public Domain Dedication (CC0): This is a tool for the creators to dedicate the item to the public, waving all their copyrights.
This work is a derivative of a CC0, Public Domain Dedication .		

Figure 2: *Illustrating six types of licenses derived from combinations of four different permissions*

Source: Creative Commons, A Rough Overview (2024).⁷

Many public organizations and governments are using Creative Commons licenses⁸ to share public data. These licenses are essential for maximizing the reuse of data and databases, since otherwise, it may be unclear whether data and databases are restricted by copyright or other rights. In addition, licenses must conform to the principles laid out in the Open Definition.⁹

Over the past few years, many new data licenses have been drafted, often by governments. Some European Union member states developed customized licenses that could undermine the interoperability of public sector information. Moreover, the European Commission warned member states against the development of customized licenses and issued Guidelines that clearly state that license conditions should be standardized and contain minimal requirements.

The Guidelines (Commission Notice 2014/C 240/01) explained that open-standard licenses, such as the latest Creative Commons (CC) licenses (version 4.0), allow the reuse of public-sector information without the need to develop and maintain custom licenses at the national or sub-national level. Additionally, the Open Data Directive (Directive 2019/1024/EU) establishes rules governing and limiting exclusive arrangements. Exclusive reuse rights are, in principle, prohibited, and the Open Data Directive restricts the possibility of granting reuse rights only to certain users, thereby violating the non-discrimination principle and the equality of actors in the

⁷ Creative Commons a Rough Overview (2024) <https://libraries.uta.edu/news/creative-commons-rough-overview> visited 12/12/2025

⁸ What are our licenses for? <https://creativecommons.org/licenses/> visited 30/11/2025

⁹ 'Open Definition 2.1'. <http://opendefinition.org/od/2.1/en/> visited 12/12/2025

market. Moreover, any such exclusive rights that are exceptionally permitted must be transparent and publicly disclosed (Katulić, 2018; Musa, 2015).

The current practice in publishing open data depends mainly on policies governing which types of data can be published and on license agreements concerning the use and reuse of published data. An essential precondition for opening government data is not disclosing the sensitive private data of individuals and companies. Thus, it needs to take into account that open data is not always of utter importance (Dalla Corte, 2020).

Open data needs to be coordinated with all other rights that may be diminished by the use of published data, amongst which the right to privacy and data protection are arguably of the most significant importance (Katulić et al., 2022). Despite not mentioning names, there is a potential risk that individuals may remain indirectly identifiable through addresses or other personal information published in specific cases. For example, the publication of court decisions can be a severe intrusion on privacy, especially in criminal law and sensitive family law cases. Therefore, scholarly and policy attention is paid to methods for privacy-preserving and anonymization of open data - tools for publishing useful information while preserving data privacy (Charalabidis et al., 2016). However, it should be considered that anonymization is not automatic and cannot be granted in all cases.

In addition, the recent implementation of the European Union's General Data Protection Regulation (GDPR) has heightened awareness of the need to prevent and mitigate the risks of personal data disclosures. The GDPR has also greatly affected the open data community. Before making data available, public organizations should consider issues related to data breaches, misuse of personal information, and the potential for malicious assumptions from publicly available data (Brandusescu et al., 2019). However, it should be noted that all data protection laws regulate the processing of all information, including also personal data, not by prohibiting it but by setting rules and principles for how to do it (Dalla Corte, 2020).

Further, the Open Data Directive does not apply to documents whose supply falls outside the scope of the public task of public sector bodies; documents held by public undertakings that fall outside services of general interest or are subject to competition; documents protected by third-party intellectual property rights; and documents excluded or restricted from access due to national security, defense, public safety, statistical or commercial confidentiality, critical infrastructure protection, or other access restrictions under national access regimes.

Consequently, unless access to data is limited by intellectual property rights, personal data protection, or some specific restrictions under national access regimes, data's (re)use should be made accessible to the public to generate added value.

2.3. Overview of the European Union legal framework for open data

The European Union, among the first in the world, concluded that data generated with public funds should be made freely available for (re)use by the public (individuals and businesses). This approach was driven by the belief that broader access to public sector information (PSI) could support the development of a digitally enabled democracy, foster transparency, and stimulate innovation across the economy and society. The origins of the European Union's open data policy can be traced to the recognition of public sector information (PSI) as a valuable strategic resource for the emerging information society and digital economy.

A key milestone was the European Commission's 1998 Green Paper, Public Sector Information: A Key Resource for Europe, which highlighted differences in national approaches to PSI access and reuse and called for greater harmonization. Since the mid-2000s, the European Union has progressively developed a legal framework for open data and implemented a range of legislative acts and initiatives promoting the use and reuse of public sector information across member states. Special emphasis has been placed on regulating constraints that affect data sharing.

2.3.1. The Directive on the re-use of public sector information (PSI Directive)

The Directive on the re-use of public sector information (Directive 2003/98/EC), the so-called PSI Directive, is often seen as the key starting point of the open data movement in the European Union (Charalabidis et al., 2018). With the adoption of the PSI Directive in 2003, the European Union regulated the process of opening data collected by governmental institutions and agencies in the exercise of their responsibilities (Andraško & Mesarčík, 2018; Musa, 2019). The PSI Directive highlighted the economic aspect and value of the (re)use of public sector information and encouraged European Union member states to maximize the availability of public data for reuse (Susha et al., 2015).

The PSI Directive laid out a general framework for the conditions governing the reuse of public sector documents to ensure fair, proportionate, and non-discriminatory conditions for the reuse of public sector information. The PSI Directive established a set of minimum rules regulating

the reuse of public sector information and the practical measures necessary to facilitate the reuse of existing documents held by public sector bodies.

Under the PSI Directive, public sector bodies are required to make information available in the formats in which it already exists, without imposing unnecessary changes. It applies to existing documents held by public sector bodies of the Member States, including executive, legislative, and judicial authorities. Pricing for reuse must be cost-oriented, ensuring that charges are transparent and limited to what is necessary, and public bodies are not permitted to charge more than marginal costs. To provide legal certainty for users, the conditions governing the reuse of documents must be defined in advance and made publicly available. The conditions for reuse should be set out through standard licenses.

The PSI Directive establishes a general principle that documents made accessible by public sector bodies may be reused for both commercial and non-commercial purposes under non-discriminatory conditions, unless they are protected by third-party copyright or subject to restrictions set out as exclusions listed in Article 1.

Accordingly, the PSI Directive does not apply to documents outside the public task of public sector bodies; documents subject to third-party intellectual property rights; documents excluded from access for reasons of national security, defense, public safety, or statistical and commercial confidentiality; and documents held by public service broadcasters, educational and research institutions, and cultural establishments. Furthermore, this Directive does not affect national access regimes and does not apply where access to documents requires proof of a specific interest.

The limitations of Directive 2003/98/EC lie in the fact that it imposes no obligation regarding access to documents or the reuse of documents. The decision whether or not to authorize reuse remains with the member states or the public sector body concerned. Moreover, the PSI Directive is based on existing national rules on access to documents and therefore does not require the reuse of documents where access is restricted or excluded under national law. Such restrictions may include rules limiting access to citizens or companies who demonstrate a particular interest in obtaining access to documents, or exclusions based on the sensitive nature of the documents, including, inter alia, considerations of national security, defense, or public security.

The development of digital technologies, the increase in data volume, the shift towards a digital economy, and the perception of unequal levels of data openness across the European Union

member states led to the revision of the PSI Directive in 2013 (Andraško & Mesarčik, 2018; Musa, 2019). In this context, there was a need to amend the PSI Directive to establish a clear obligation for member states to ensure that all documents are reusable, unless access is restricted or excluded under national rules on access to documents, and subject to the other exceptions laid down in the Directive.

The main objectives of amendments to the PSI Directive (Directive 2013/37/EU) are to stimulate the further development of a European market for services based on public sector information and to enhance the cross-border use and application of public sector information in business processes. Directive 2013/37/EU attempted to make data more open and accessible by minimizing costs, expanding the circle of public institutions within scope, establishing more precise rules for the protection of users' rights, and removing discriminatory practices (Musa, 2019).

The most significant changes included an expanded scope covering libraries, archives, museums, and university libraries; a general obligation to permit the reuse of accessible public data for both commercial and non-commercial purposes; and a requirement to make documents available through open and machine-readable formats together with their metadata. The Directive (Directive 2013/37/EU) introduced a default charging rule limited to marginal costs, increased transparency of charging conditions, and allowed licensing conditions such as source acknowledgment. It also strengthened remedies through swift, impartial review mechanisms, prohibited cross-subsidization, and banned exclusive arrangements, subject to limited exceptions in the public interest. Moreover, for most European Union member states, "*open by default*" has become one of the fundamental principles of open data-related legislation.

In addition, in 2014, to harmonize the legal framework and practice across the European Union and to encourage further data openness, the European Commission adopted Guidelines (Commission Notice 2014/C 240/01) explaining the obligations arising from the revised PSI Directive (Andraško & Mesarčik, 2018; Musa, 2019) and to indicate best practices in key areas relevant to the reuse of public sector information.

The Guidelines provide non-binding guidance aimed at national administrations and focus on three subject areas of particular importance for the reuse of public sector information. They are intended to support the transposition of the revised Directive (Directive 2013/37/EU) and to promote practices that enhance the role of public sector information in the digital market, including recommendations on the use of open standard licenses, the content of custom-made

licenses, priority datasets for publication, measures to improve reusability, and the application of the marginal cost rule.

Moreover, as the European Union's open data market plays a central role in the wider European Union data economy, there was a need to modernize the legislative framework in line with recent advances in digital technologies and to stimulate digital innovation further. Consequently, the European Union enacted the Directive on open data and the re-use of public sector information (Directive 2019/1024/EU), commonly known as the Open Data Directive.

2.3.2. The Open Data Directive

The Open Data Directive (Directive 2019/1024/EU), adopted on 20 June 2019, lays down the legal framework for the reuse of public sector information and replaces and repeals the PSI Directive (Directive 2003/98/EC). The European Union member states were required to transpose the new rules into national legislation by July 16, 2021. The term "*open data*" was officially introduced into the EU regulatory framework with the adoption of this Directive, which marks the culmination of the major revisions in 2013 and 2019, shifting the regulatory focus from merely permitting the reuse of public sector information to actively promoting open data, including free-of-charge access to high-value datasets. This shift is further reflected in the change to the Directive's title, through the inclusion of the wording "open data", which provides greater clarity and strengthens the requirement and obligation for public bodies to publish data in open formats.

As the key EU-level instrument on open data, the Directive seeks to strengthen the European data economy by increasing the availability of publicly held and publicly funded data for reuse and by providing standard rules for a European Union market in government-held data (Katulić et al., 2023). In addition, the Directive stimulates innovation in products and services by encouraging the use of the growing volume of high-quality, high-value data from publicly funded services that are freely accessible. Building on these objectives, the Directive is based on the general principle that public and publicly funded data should be reusable for commercial or non-commercial purposes. Furthermore, it strengthens the default rules on reuse, expands the range of public sector bodies covered, and establishes that research data resulting from publicly funded research should be openly accessible by default.

The scope of the Open Data Directive is extended to data held by public undertakings¹⁰ under a specific set of rules. As a result, the Open Data Directive governs the reuse of documents held by public sector bodies and public undertakings in member states¹¹. However, this Directive applies only to data that public undertakings make available for reuse (Broomfield, 2023; Musa, 2019). Also, the Open Data Directive imposes an even stronger requirement on reuse by default - member states shall encourage the availability of documents according to the principle of "*open by design and by default*", facilitate metadata aggregation, and simplify access to documents.

However, not all information is appropriate for unrestricted open reuse, and as a result, the Open Data Directive also excludes certain categories of public-sector information. For example, the Directive does not cover documents protected by third-party intellectual property rights, commercially confidential materials, or information whose access is restricted under applicable regimes protecting personal data. In general, data must be made openly available and reusable under the Open Data Directive unless doing so would cause clear and disproportionate harm to a third party who could suffer negative consequences by having data that relates to them being openly available (Graux, 2024).

The key novelty adopted by the Open Data Directive lies in defining the concept of high-value datasets. High-value datasets are defined as data whose reuse generates significant benefits for society, the environment and/or the economy (Broomfield, 2023; Kević et al., 2023). For the purpose of ensuring their maximum impact and to facilitate reuse, the high-value datasets should be made available for reuse with minimal legal restrictions and free of charge, in machine-readable formats, provided via Application Programming Interfaces (APIs), and, as a bulk download, where relevant.¹² Although it does not explicitly specify which datasets are considered as high-value, the Directive proposes six thematic categories of high-value datasets in the Annex to the Directive, including geospatial, earth observation and environment, meteorological, statistics, companies and company ownership, and mobility (Kević et al., 2023).

¹⁰ Public undertakings mean any undertaking over which public-sector bodies have a dominant influence through ownership, financial participation therein, or the rules which govern it (Article 2 (3) of Directive 2019/1024/EU)

¹¹ The directive promotes the use of open data in Article 5 (1) of Directive 2019/1024/EU 'public sector bodies and public undertakings shall make their documents available in any pre-existing format or language and, where possible and appropriate, by electronic means, in formats that are open, machine-readable, accessible, findable and reusable, together with their metadata. Both the format and the metadata shall, where possible, comply with formal open standards.'

¹² European legislation on open data <https://digital-strategy.ec.europa.eu/en/policies/legislation-open-data> visited 14/12/2025

Additionally, in January 2023, the Commission adopted a list of specific high-value datasets by way of an Implementing Regulation (EU) 2023/138. The mentioned Regulation lays down a list of concrete high-value datasets, within the limits of the six categories defined in the Open Data Directive (geospatial, earth observation and environment, meteorological, statistics, companies and company ownership, and mobility) and the arrangements for their publication by member states. The newly published list of high-value datasets unlocks a large amount of public data for the benefit of all. These datasets are governed by a more ambitious set of rules designed to significantly reduce entry barriers to the European data-driven market and increase the level of data reuse. The additional set of requirements, therefore, clarifies the practical mechanisms for accessing open data and high-value datasets.

Starting from June 2024, high-value datasets must be made available for reuse: free of charge, under the Creative Commons BY 4.0 license or an equivalent or less restrictive open license, in a recognized open, machine-readable format, accessible via APIs and bulk download, and in their most up-to-date version. Therefore, the member states must ensure that the associated metadata explicitly identifies datasets as high-value to enhance their discoverability.

The Open Data Directive, as it stands, applies to all sectors of public administration, including education, research, and culture. Publicly funded research data are also now covered by the Open Data Directive. Also, amendments have been made to the charging stipulations to limit further the possibility of charging costs (Broomfield, 2023; Musa, 2019). The Open Data Directive determines that data should be made free of charge or that charges should be limited to the marginal cost of reproducing and disseminating documents, anonymizing personal data, and protecting commercially confidential information (Broomfield, 2023; Musa, 2019).

The Open Data Directive establishes the notion of a standard license as a set of predefined reuse conditions in digital format that are aligned with and compatible with standardized public licenses available online (Broomfield, 2023; Musa, 2019). This Directive requires member states to encourage public sector bodies to use standard licenses. Also, the mentioned Directive imposes on the member states a requirement to ensure that standard licenses for the reuse of public sector documents, which can be adapted to meet particular needs of individual groups of information, are available in digital format and can be processed electronically (Broomfield, 2023; Musa, 2019).

The Open Data Directive encourages transparency and openness and tackles the emergence of new forms of exclusive arrangements. The allocation of exclusive rights to reuse a specific set of data to a single user, with the exclusion of others, has a negative effect on competition

and is prohibited (Musa, 2019). In an effort to circumvent the fact that it was challenging to avoid specific contracts defining exclusive rights in practice, the Open Data Directive imposes a rule that governs exclusive arrangements and requires the reuse of documents to be open to "all potential actors in the market, even if one or more market actors already exploit added-value products based on those documents." In addition, this Directive establishes that both contracts or other arrangements between the public sector bodies or public undertakings holding the documents and third parties that implicitly or factually restrict reuse by other users shall not grant exclusive rights. The rule is based on the idea that an exclusive right is possible and necessary only to provide a service in the public interest (Musa, 2019). Also, the validity of the reason for granting such an exclusive right is subject to regular review and is expected to be reviewed every three years.

In addition, Musa (2019) argues that the novelty of the Open Data Directive is that it identifies the bad practice of concealing the exclusive rights allocation, i.e., such legal and practical solutions that restrict reuse only to specific users, which violate the non-discrimination principle and affect the equality of actors on the market. Thus, it is paramount that all such exclusive rights granted after the entry into force of the Open Data Directive are transparent and publicly disclosed (Musa, 2019).

The Open Data Directive establishes a relatively balanced framework and plays a crucial role in promoting the reuse of public sector information across the European Union by defining minimum criteria for public sector bodies to make such information available (Broomfield, 2023). It sets out a general principle of openness: when data falls within the Directive's scope and is not subject to any exclusions, public sector bodies are expected to make data openly available. The Directive also expressly promotes the use of portals for publishing open data, thereby supporting the development of an effective open data governance system (Graux, 2024).

2.3.3. The Data Governance Act

Per Katulić et al. (2023), another central component of the European Strategy for Data is the Data Governance Act, which aims to build trust in data sharing, enhance mechanisms that boost data availability, and address technical barriers that hinder data reuse.¹³ The Data Governance Act entered into force on 23 June 2022, and it has been applicable since September 2023. The Data Governance Act (Regulation (EU) 2022/868) introduced several

¹³ European Data Governance Act <https://digital-strategy.ec.europa.eu/en/policies/data-governance-act> visited 14/12/2025

vital developments within the European Union's legal framework, affecting both the availability and reuse of public sector information (PSI) and broader aspects of data governance in general (including in purely private sector use cases that would fall outside the scope of the Open Data Directive). The Data Governance Act brings forward several key innovations aimed at strengthening trust, enabling data sharing, and supporting the responsible reuse of data across the European Union (Katulić et al., 2023).

The Data Governance Act is a cross-sector framework designed to regulate the reuse of protected public-sector data (Katulić et al., 2022). It promotes data sharing by establishing a legal framework for new types of data intermediaries and by encouraging voluntary data sharing for altruistic purposes. It covers both personal and non-personal data, with the General Data Protection Regulation (GDPR) applying whenever personal data is involved. Alongside the GDPR, the Data Governance Act introduces additional safeguards designed to strengthen trust in data sharing and reuse - an essential condition for increasing the availability of data on the market.¹⁴

While the Open Data Directive governs the reuse of publicly available information held by the public sector, it is essential to note that the public sector also possesses large volumes of protected data, including personal data or commercially confidential information, which cannot be made openly available as open data but may be reused under specific EU or national laws. Valuable insights can be extracted from this type of data without compromising and undermining its protected status. By establishing clear rules and safeguards, the Data Governance Act seeks to enable such reuse in a way that maximizes the value of the data whenever permitted by other applicable legislation¹⁵.

Katulić et al. (2023) explain that, considering the objectives of the Data Governance Act and the context outlined above, the relevance of the new legal framework for the open data community is evident. In particular, regarding the sharing of sensitive information and the role of secure processing environments, the impact is explicit: the public sector must now carefully assess whether such data can be legally made available for reuse. This marks a significant shift from the previous framework, which may have inadvertently encouraged public sector bodies to assume that, because the Open Data Directive did not apply, sharing was unnecessary - potentially leading to missed opportunities (Graux, 2024). Under the Data

¹⁴ Data Governance Act explained <https://digital-strategy.ec.europa.eu/en/policies/data-governance-act-explained> visited 14/12/2025

¹⁵ Data Governance Act explained <https://digital-strategy.ec.europa.eu/en/policies/data-governance-act-explained> visited 14/12/2025

Governance Act, public sector bodies are required to explore positive options for data sharing, including leveraging secure processing environments and implementing anonymization or pseudonymization solutions, rather than defaulting to the simpler option of non-disclosure.

To promote the effective implementation of the new data governance rules, Article 29 of the rules establishes the European Data Innovation Board (EDIB). Operating primarily as an expert group, the EDIB is tasked with assisting the European Commission in coordinating policies and practices related to open data, while also supporting the cross-sectoral use and sharing of data (Katulić et al., 2023).

2.4. Open data ecosystem and infrastructure

An ecosystem consists of interconnected elements within a shared environment, where the system's behavior cannot be understood by examining individual components or interactions in isolation, but only by considering the system as a whole (Calzati & van Loenen, 2025). Similarly, a data ecosystem refers to the network of sociotechnical elements, actors, and processes that collectively enable the creation and management of data-driven initiatives. Governing such a data ecosystem, therefore, involves balancing the diverse data interests of all participating actors, guided by shared values and with attention to the socioeconomic sustainability of the system as a whole (van Loenen et al., 2021).

The open data landscape involves diverse actors and users with different needs, problems, expectations, and envisioned opportunities. Open data is typically viewed as part of a broader system known as the open data ecosystem. In 2011, Rufus Pollock coined the term "open data ecosystem" (van Loenen et al., 2018). Pollock argued that traditional open data systems, in which data flows only from providers to users, should evolve into ecosystems. In these ecosystems, data is continuously circulated and reused among both data providers and data users (van Loenen et al., 2021). Open data ecosystems adopt an approach to open data that extends beyond data accessibility to encompass the broader environment for open data use (van Loenen et al., 2021). The added value of this open data ecosystem perspective lies in its emphasis on the relationships and interdependencies between social (publishers and users of open data) and technological (data linking, big data analysis, storing, and visualizing) factors that shape the performance of open data activities (van Loenen et al., 2021).

An open data ecosystem facilitates interaction and communication among everyone interested in open data and the uptake of data for (re)use.¹⁶ By establishing an open data ecosystem¹⁷, governments can convince internal and external actors, stakeholders, and interested parties to share data and make it available for (re)use, enabling the development of services for citizens. Various actors¹⁸, such as open data providers, users, and legislators, play a role in the ecosystem.

Besides, open data ecosystems are also often government ecosystems, as governments publish a great deal of open data (Kutnjak et al., 2021). These open government ecosystems highlight the numerous and diverse interrelationships between data, open data providers, open data users, material infrastructures, and institutions (Zuiderwijk et al., 2013). The main factors impacting the development of an open government ecosystem are 1) information, communication, and networking technology infrastructure, 2) e-government, e-business, and e-society, 3) human resource development, and 4) a policy and regulatory environment (Zuiderwijk et al., 2013).

Van Loenen et al. (2021) define an open data ecosystem as "a cyclical, sustainable, demand-driven environment oriented around agents that are mutually interdependent in the creation and delivery of value from open data," and take the premise that a value-creating, sustainable open data ecosystem needs to be user-driven, circular, inclusive, and skill-based.

The open data ecosystem cannot be established without several key prerequisites that enable the ethical, lawful, and effective use of data to generate social and economic value. Welle Donker and van Loenen (2017) explain that the key to an effective open data ecosystem is accessibility from a technical, legal, and organizational perspective.

Additionally, Ali et al. (2024) explain that several key factors - technical, semantic, organizational, and legal - strongly influence the functioning and effectiveness of

¹⁶ Best Practice: Establish an Open Data Ecosystem <https://www.w3.org/2013/share-psi/bp/eode/> visited on 14/12/2025

¹⁷ Zuiderwijk et al. (2014) describe that an open data ecosystem should capture the four essential elements: 1) releasing and publishing open data by public organizations on the Internet, 2) searching, finding, evaluating, and viewing both raw and processed data and their related licenses, 3) detecting and correcting records in a dataset, analyzing, enriching, combining, linking and visualizing data and 4) interpreting and discussing data and providing feedback to the data provider and other stakeholders. Besides, Zuiderwijk, et al. (2014) argue there should be three additional elements 5) user pathways showing directions for how open data can be used, 6) a quality management system, and 7) different types of metadata to be able to connect the elements.

¹⁸ Kitsios et al., 2017 have identified five roles for the actors involved in the open data ecosystem; data providers, service providers, application developers, application users, and infrastructure and tool providers.

interoperability within the context of open data ecosystems. Semantic interoperability enables shared meaning and understanding of open data by defining data objects and their relationships, which is essential for drawing valid conclusions and generating high value from multiple data sources. Equally important are organizational dimensions, including clearly defined responsibilities and governance mechanisms for the opening and use of data, which support effective collaboration and sustainability within the open data ecosystem. Legal standards, encompassing data licensing, privacy, and regulatory frameworks, govern data sharing and usage; they establish constraints and ethical principles that shape data management, collaboration, and value creation. Technical interoperability, by contrast, focuses on data formats and standards that allow different systems to exchange and use data without difficulties. These standards are critical for enhancing transparency, fostering collaboration, and stimulating innovation. Therefore, building a robust open data ecosystem requires addressing the specific requirements of each of these standards. This approach ensures that data can be technically integrated, semantically consistent, and used in ways that are both ethically responsible and legally compliant (Ali et al., 2024).

However, an open data ecosystem cannot operate effectively without the necessary infrastructure. Data infrastructure consists of data assets, the organizations that collect, store, maintain, and distribute data assets, and processes, policies, and guidelines describing how to use and govern the data. Open data infrastructure supports the widest possible range of data uses and meets the fundamental requirements of the open data ecosystem (van Loenen et al., 2018). The open data infrastructure consists of the following dimensions: users, providers, technical aspects, policy framework dimensions, financial dimension, and the governance of the infrastructure (Van Loenen et al., 2018). These typical dimensions are vital for the functioning of an open data ecosystem and are paramount to its success (Van Loenen et al., 2018).

Additionally, the European Commission foresees a critical role for open data ecosystems, which facilitate the reuse of public-sector information as well as privately-held data and "the deployment of a fully-fledged open data infrastructure" (van Loenen et al., 2021) Governments and their public organizations generate and collect an enormous amount of diverse data during their operations and service (Charalabidis et al., 2018; Vrček, 2015), and a reliable open data infrastructure is required to unlock the potential this open data holds to benefit citizens. Van Loenen et al. (2021) argue that by tackling the challenges involved in developing user-driven, circular, inclusive, and skill-based open data ecosystems, open data systems can continue to generate significant societal value in a sustainable manner and can thus be considered as true open data ecosystems.

On top of that, open data infrastructures are typically held and maintained by governmental organizations (Zuiderwijk, 2015). Zuiderwijk et al. (2013) argue that open data infrastructures should stimulate the provision and (re)use of open data and realize their benefits. Interoperable government open data portals and websites are essential to building a robust open data ecosystem, enabling institutions to amplify the benefits they could achieve individually (Ali et al., 2024). Besides, the opening of public data by government organizations has lately resulted in the launch of various open data portals designed to serve as primary points of access to government data (Máchová & Lnénicka, 2017). As the paper explained earlier, open data portals are a critical part of data infrastructure, and open data portals should be seen as part of a broader open data ecosystem in which each component can add value (Zuiderwijk et al., 2013).

2.5. Open data & Artificial Intelligence - new ways of engaging with open data

Ongoing technological advancements are driving the widespread adoption of Artificial Intelligence (AI)¹⁹ across multiple sectors. AI systems are complex mathematical models trained on data to process, analyze, and interpret large volumes of data and information. Their primary purpose is to identify patterns, generate insights, and produce predictions or recommendations. AI is changing how content is created and consumed, making processes more efficient and experiences more personalized.

Recent advances in AI performance and capability have been driven by methodological developments in algorithms and training techniques, increased computational capacity, and the growing availability of data. AI systems have enormous potential to benefit society. As AI continues to shape the future of technology, the role of open data has become more critical than ever (Malaccorto, 2025). When AI is combined with open data, it creates new opportunities both to generate insights from open data and to enable innovative AI applications.

Data is a fundamental component of AI systems, as their effectiveness and reliability depend heavily on the quality, quantity, and diversity of the data used during training and operation. Open datasets fuel innovation, transparency, and accountability in AI systems, enabling researchers, developers, and policymakers to build smarter, fairer tools (Datos.gob.es, 2024). The unrestricted availability of open data to users, without limitations on (re)use, allows

¹⁹ Artificial Intelligence (AI): 'is a machine-based system, that for explicit or implicit objectives infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions' (Russell et al., 2023).

enterprises to integrate open data into their AI systems. This central role of open data highlights the strong connection between open data and AI system performance. It has been recognized that data that meet open data criteria could further enhance AI systems while mitigating potential risks, including deficiencies in fairness, accountability, and transparency. AI and data science methods have the capacity to discover new information from large, open data sources (Ziesche, 2023).

Open data and AI are closely interconnected and mutually dependent, and their interaction plays an important role in supporting Europe's digital transition. The relationship between open data and AI is reciprocal, with each enhancing the value and effectiveness of the other. From one perspective, open data can significantly improve AI systems by providing access to large-scale, diverse, and reusable datasets (Chafetz et al., 2024). Exposure to a broader range of data increases the potential for AI models to achieve greater accuracy and generate more meaningful predictions. Open data can be a source of large amounts of diverse information for AI systems (Ziesche, 2023). In this context, open data serves as a critical input that supports the development of high-performing AI systems. On the other hand, AI can unlock additional value from open data. AI can analyze large volumes of data and identify trends and patterns that might not have been revealed through other conventional analysis techniques and approaches. Open data contains rich and complex information from which insights can be derived, and AI acts as a powerful analysis tool to extract insights and generate knowledge from open data.

The variety of open data widens and expands the possible use cases for AI systems, enabling new opportunities and the development of innovative AI-driven products and services. These use cases depend on the availability of relevant, high-quality, and easily accessible data. Free and open availability of diverse datasets through open data is therefore essential to drive innovation, create novel economic opportunities, and support effective AI development. While the breadth of subject areas covered by open data enables broad use cases for AI systems, the availability of extensive open data within specific domains further enhances the performance and impact of AI systems.²⁰

Recently, generative AI²¹ has rapidly transformed the way users access and interact with information, with popular services such as ChatGPT, Gemini, Copilot, and Claude leading the

²⁰ Open data and AI: A symbiotic relationship for progress

<https://data.europa.eu/en/publications/datastories/open-data-and-ai-symbiotic-relationship-progress>

²¹ *Generative AI*: includes a range of models that can generate content based on training data. Generative Pretrained Transformers, or GPTs, for example, enable computers to perform tasks that mimic certain human brain functions such as interpreting language or generating code.

way. Generative AI and applications powered by large language models (LLMs) are now commonly used to answer specific questions, support decision-making, and enhance search engine capabilities (Chafetz et al., 2024). As generative AI continues to reshape information access, there is a growing opportunity to explore how these technologies can benefit society.

Loukis et al. (2023) argue that it is necessary to examine the capabilities that ChatGPT can offer in relation to both traditional government functions and activities, as well as more recent and emerging ones. To achieve this, it is essential to understand how generative AI models can utilize open data that is reliable and from official public sources. To effectively embrace generative AI for improving open data access and deriving deeper insights from open data, public data holders, as well as government agencies that open/publish some of their data, must first make progress across five main areas: enhancing transparency and documentation; upholding data quality and integrity; promoting interoperability and standards; improving accessibility and usability; and addressing ethical considerations. Additionally, generative AI offers a simple and intuitive interface that can make open data more accessible and help democratize insights. However, applying generative AI to incomplete or low-quality datasets risks generating misinformation, which could undermine trust in public institutions (Verhulst et al., 2023). Consequently, when using open data in AI applications, it is essential to account for the limitations of the data, including the conditions of the applicable license and any associated legal requirements, such as data protection and privacy obligations (Katulić et al., 2023).

Loukis et al. (2023) explain that ChatGPT could support the development of more effective open government data strategies for government agencies and facilitate better-informed policymaking by combining machine-generated insights with human expertise. In this sense, policy measures promoting the sharing of selected datasets should further enhance the diversity of open data. Consequently, expanding access to high-quality open data constitutes a critical priority for realizing the full potential of the synergy between open data and AI. Ensuring that data is accurate, timely, and adheres to the *FAIR* principles (Findable, Accessible, Interoperable, and Reusable) is crucial for converting raw datasets into actionable knowledge that benefits the public because poor-quality data drives up costs and can lead to hidden problems for AI. Data publishers must recognize their responsibility in supporting the AI ecosystem. To this end, they should take deliberate measures to ensure that their datasets meet the requirements of AI applications - that their data is AI-ready.

Generative AI Technologies/Applications: 'a type of artificial intelligence technology that can produce various types of content, including text, imagery, audio, and synthetic data.'

Generative Pretrained Transformers (GPTs): 'a language model relying on deep learning that can generate human-like texts based on a given text-based input' (Chafetz et al., 2024).

The AI-readiness of an open dataset can be conceptualized across four key dimensions: technical optimization for machine learning, overall quality and adherence to standards, legal compliance, and responsible collection practices. Collectively, these dimensions encompass a dataset's ethical and regulatory compliance as well as its usability.²² Consequently, when using open data in AI applications, it is also essential to account for the limitations of the data, including the conditions of the applicable license and any associated legal requirements, such as data protection and privacy obligations (Majithia et al., 2025).

The integration of open data with generative AI holds immense promise for innovation and development across various sectors. In the legal domain in particular, Loukis et al. (2020) observe that an important recent trend in the area of legal informatics is the growing exploitation of artificial intelligence technologies. New legal applications based on text and natural language processing, as well as machine learning, have emerged and are gradually reshaping legal practice. These tools and services support conceptual legal information retrieval and predictive legal analysis by directly linking computational models of legal reasoning with legal texts. However, despite these advancements, the legal domain remains one of the most challenging areas for automated text retrieval, as legal information retrieval relies primarily on underlying concepts rather than the explicit wording used in documents (Loukis et al., 2020). Thus, significant barriers continue to impede the full realization of this potential in the legal domain, primarily due to variations in the quality and accessibility of open datasets.

²² Prior to preparing datasets for AI applications, it is essential to ensure that open datasets satisfy certain general preconditions. Data quality is paramount, including cleanliness, completeness, and validity. Equally critical is the provision of metadata, which documents a dataset's origin, type, creator, intended uses, and other relevant information, facilitating informed and efficient decision-making. Finally, datasets should be shared as openly as possible, while respecting legal and privacy constraints. Each of these preconditions forms the foundational basis for establishing AI-readiness (Majithia et al., 2025).

3. Legal Information & Legislative Portals: A Relationship of Interdependence

Since the adoption of the first legal rules regulating public access to information held by public authorities, the right to access information has progressively become an integral part of the catalog of constitutional, or at least statutorily guaranteed, rights of citizens, which are exercised in accordance with internationally recognized legal standards (Musa, 2017). Although various open data have been made available and reusable to the public, this paper focuses on legal information and data and legislative portals as a specific type of open data portal that publishes and makes legal information and data available without restrictions for their (re)use (Alexopoulos et al., 2021).

The availability of legal information and data is crucial for legal certainty, for the conduct of legal and natural persons, and for mutual legal relations. The constitutional responsibility of states requires states to disseminate information on applicable legislation by suitable means, both to facilitate transparency and effective access to justice and to ensure citizens are able to comply with established legal norms (Musa, 2017). Due to the digital revolution, the volume of data, including legal data, published on the Internet is growing. The ability to find legal data and relevant legal documents is fundamental for ensuring the legal presumption that everyone must know laws and regulations and act upon them based on the ancient maxim *ignorantia legis neminem excusat* ("none shall be excused by their ignorance of law") - a fundamental principle of justice in most legal systems.

The normative principle that ignorance of the law is no excuse entails a fundamental corollary: the state bears an inherent obligation to publish the law and make it accessible. Therefore, legislative portals, as a specific type of open-data portal, are essential because they make legal information and data accessible to the data users who provide the legal services on which citizens and businesses rely. At the same time, however, developing legislative portals is far from straightforward. Although legislative portals promise substantial benefits, their development is characterized by considerable uncertainty and complexity (Matt et al., 2023). Public organizations must determine how to ensure comprehensive access to extensive bodies of legal information, present this specific material accurately and in a usable format, and simultaneously integrate open-data principles into the overall design of such systems.

3.1. Legal information and data

Legal information and data are specific sets of information that describe and clarify laws, legal systems, and legal processes. The legislative documents that constitute the different types of

legal data include acts, bills, case law, regulations, resolutions, administrative decisions, court decisions, and similar documents (Alexopoulos et al., 2021). Legal information and data types are commonly grouped into three major categories: (1) primary legal data (such as European Union directives and regulations, national laws and regulations, local laws and rules, presidential decrees, and executive decisions) that create binding legal obligations; (2) court decisions (case laws) that interpret and apply the law and may establish precedents and guide future legal interpretations, and (3) parliamentary data including pre-bills, bills, and all accompanying documents that represent materials produced during the law-making process.

The growing complexity of the problems and challenges confronting modern societies has led to the creation of extensive, highly intricate, and continuously evolving legislative frameworks to address them (Alexopoulos et al., 2024). Governments and local authorities enact new legal acts, regulations, and policy measures on a daily basis. In parallel, courts continuously issue judicial rulings, and administrative bodies publish a wide range of decisions that have legal relevance. Collectively, these documents constitute the core of a legal information ecosystem that evolves rapidly and requires constant monitoring. In general, legal information is contained in documents stored in legal databases or published on legislative portals. However, the degree of accessibility varies widely. Court decisions, for example, are not always made publicly available due to privacy considerations or inconsistent publication practices (Musa, 2017). Even when accessible, these decisions are rarely offered in machine-readable formats, limiting their potential for automated processing and large-scale analysis (Alexopoulos et al., 2020).

Although society is overwhelmed with a vast amount of legal information available in digital format, only legal professionals²³ possess the specialized education and practical knowledge required to interpret complex legal language, evaluate the significance of different types of legal information, understand legal procedures, and stay up to date with the latest legislation and case law at both national and European levels (Virkar et al., 2020).

The primary users of legal data include legal experts and practitioners, researchers, legal scholars and students, each with diverse informational needs. Lawyers may require quick access to specific precedents, while researchers may seek large volumes of legislative or judicial texts for empirical studies, and legal scholars might analyze doctrinal trends across jurisdictions. All of these legal data users continuously seek access to this type of data to

²³ Legal Professionals: the members of this user group belong to a highly specialized community of practice, united by an advanced level of legal expertise developed through a combination of formal legal education and professional experience (Virkar et al., 2020).

support their work. While these individuals seek legal information primarily for professional and academic purposes, they also play an active role in producing legal knowledge through expert analysis, interpretation, theorization, and reasoned argument (Virkar et al., 2020). These diverse needs make the availability, structure, and quality of legal data crucial for supporting professional and academic work (Alexopoulos et al., 2020).

Legal data represents a specific category of open data, and its lifecycle - involving creation, publication, discovery, use, linking, and reuse - has become an important research domain. The legal information environment is frequently highly complex (Virkar et al., 2021). Legal data artifacts exist in a wide range of, albeit partly standardized, forms and formats. They are created, maintained, and stored across diverse locations and infrastructures, and their accessibility varies considerably. Their constituent elements are often complex, and there may be multiple purportedly "standard" formats for presenting legal texts, reflecting the differing national or sub-national legal contexts in which they are produced. Also, legal language is often convoluted and challenging to interpret (Virkar et al., 2020).

Although legal information is generally considered "*open by default*," its practical openness is often constrained. In many jurisdictions, legal documents are available only in highly restrictive, non-machine-readable formats such as scanned PDFs or static web pages. This makes it difficult for users to locate and extract the specific information they need (Alexopoulos et al., 2020). Moreover, valuable information in legal documents is frequently embedded or hidden within unstructured text and must be extracted before it can be transformed into usable legal data. Additionally, such formats prevent efficient searchability, hinder text extraction, and complicate interoperability with digital tools and platforms (Alexopoulos et al., 2020). As a result, even when legal information is publicly available, it may not be genuinely accessible.

Table 6: *Illustrating key characteristics and challenges in the legal data ecosystem*

Theme	Description	Key Challenges
Nature of Legal Data	Legal data is a specific category of open data.	Complex legal information environment.
Formats and Standards	Legal data exists in various forms and formats, some of which are standardized.	Lack of uniformity, multiple competing standards, and jurisdiction-specific variations.
Storage and Accessibility	Legal documents are often created, maintained, and stored across different locations and systems.	Uneven accessibility and fragmented storage infrastructures. Public availability does not guarantee genuine accessibility or effective reuse. A substantial portion of legal information currently remains fragmented across disparate legal databases and hard-to-access systems.

Openness of Legal Information	Legal information is generally considered "open by default."	Practical openness is limited by restrictive publication formats and accessibility barriers.
Data quality	Legal data should be made available in an open, machine-readable format along with its metadata.	Poor data quality. Many legal documents are published as scanned PDFs or static web pages. Difficult information retrieval, limited searchability, and poor machine processing capabilities.
Information Extraction	Valuable information is often embedded within unstructured text.	Requires extraction and transformation before it can be used as structured legal data.

Source: Author based on Alexopoulos et al., 2020; Virkar et al., 2020.

Making case law publicly available is essential for ensuring transparency and accountability within the judicial branch (Musa, 2017). Strengthening the transparency of the judicial branch seeks to reverse the general trend of declining public trust in the judiciary and to bring the justice system closer to citizens. The legitimacy of the judiciary fundamentally rests on the professionalism and ethical conduct of judges, as well as on the public accessibility of judicial decisions. Transparency in these areas is therefore essential both for fostering judicial excellence and independence and for ensuring the legitimacy of judicial authority (Alexopoulos et al., 2020). Transparency, particularly with regard to the courts, is widely considered as a necessary precondition for effective oversight of the judiciary. It enables the public to become acquainted with the functioning of the courts, the development and application of the law, and the practical implementation of legislation. In this way, transparency enhances public confidence in the judiciary as a whole (Alexopoulos et al., 2020; Musa, 2017).

A prevailing trend among European Union member states is the systematic publication of judicial decisions, particularly those of higher courts, through dedicated legal portals administered either by the executive branch (governments or ministries of justice) or by supreme courts. Such portals are typically designed as comprehensive, centralized points of access to case law and legal information. In addition to case law from courts across different jurisdictions and instances, including European courts, they also encompass legislation and significant administrative practice (Alexopoulos et al., 2020; Musa, 2017). Of particular importance is the fact that these portals need to facilitate the reuse of legal information by granting access to judicial decisions and their associated metadata in machine-readable formats (Virkar et al., 2021). This enables the use of case law for the creation of added value, including academic research, public oversight, the commercial provision of legal services, and the promotion of consistency and harmonization of judicial practice (Musa, 2017).

Judicial decisions can be considered as information from the public sector and potentially in line with open data requirements, and could fall under open data principles. However, while the majority of jurisdictions do publish court decisions, some still do not. In practice, some jurisdictions release only those rulings deemed of significant public interest, whereas others publish all decisions unless there is an apparent and valid reason to withhold them (Alexopoulos et al., 2020; Musa, 2017). Although court decisions are sometimes open in practice, legal data is often implemented as public access to legal information "open by default" rather than as access to this information in a database format. As a result, anyone wishing to analyze thousands of decisions must often collect the documents manually. Moreover, many jurisdictions still lack machine-readable court decision databases altogether (Virkar et al., 2021).

While access to legislation is already covered in the Open Data Index by Open Knowledge²⁴, the current criteria only require that all national laws and statutes be available online, excluding judge-made law. Given that case law constitutes a significant source of legal authority - particularly in common law jurisdictions - it should be incorporated into the mentioned legislation dataset in the future (Dusséaux, 2016). In addition, a substantial portion of legal information currently remains fragmented across disparate legal databases and hard-to-access systems (Virkar et al., 2021). As a result, users often struggle to locate legal information in an efficient manner to obtain all the relevant information and materials they need (Charalabidis et al., 2018). For legal professionals in particular, the ability to identify and find relevant legal data and documents - whether to build a legal case or remain informed about specific legal developments - is indispensable (Alexopoulos et al., 2020).

Legal data should be made available in an open, machine-readable format along with its metadata. Legal documents should meet official and established open standards. A legal document in a machine-readable format can be considered a document if it is in a file format structured so that software applications can easily identify, recognize, and extract specific legal data from the document (Andraško & Mesarčík, 2018). In terms of machine-readable format, it should be an open format - a file format that is publicly available without any restriction that would prevent reuse. The HTML format or Portable Document Format (PDF) is usually used. Although PDF is considered as an open standard, it is not machine-readable and therefore is not suitable as an open data format (Andraško & Mesarčík, 2018).

²⁴ Tracking the state of open government data <https://okfn.org/en/who-we-are/our-history/global-open-data-index/> visited 14/12/2025

In conclusion, open legal data constitutes a critical mechanism for advancing the protection of fundamental rights and enhancing legal certainty by providing transparent, accessible, and verifiable access to legislation and judicial decisions. Nevertheless, the mere publication of legal data is insufficient to achieve these objectives. Its effectiveness depends on the completeness, currency, and machine-readability of the legal information provided (Alexopoulos et al., 2020). Furthermore, excessive technical complexity may continue to impede meaningful access if legal data is not accompanied by clear and comprehensible interpretive guidance.

Facilitating easier access to legal data and information enables citizens, legal practitioners, and businesses to verify applicable norms independently, without relying on costly legal databases or intermediary services (Alexopoulos et al., 2020). Accurate and timely legal information is a strategic resource for effective decision-making for a wide range of actors. In this context, legislative portals play a crucial role, serving as primary sources and repositories that provide access to official legal texts.

3.2. Legislative portals

In order to have a binding effect, acts, laws, and regulations must have been brought to the attention of the citizens. Individuals must be notified about any decisions that affect them, which means all regulatory measures must be published (Alexopoulos et al., 2020). Historically, acts, laws, and rules were posted on official bulletin boards. Nowadays, legislative portals provided and supported by a specific government body (such as a particular ministry) are used for this purpose. At first glance, providing access to the law might appear as simple as publishing legal information online. However, early advocates of open legal data have emphasized that making the law truly accessible involves more than merely getting it online (Nishikawa-Pacher & Hamann, 2023).

The legislative portals serve as a central, publicly available, free-of-charge, web-accessible platform that contains legal documents, such as legislation and court decisions, published by various government authorities, including legislative bodies, courts, and tribunals. Moreover, every jurisdiction has an official manner in which they publish legally binding amendments to existing laws or announce the repeal of laws, commonly through bulletins or law gazettes (Filtz et al., 2021). Although established with a common objective, legislative portals exhibit markedly different characteristics. They vary in scale, scope, domain coverage, comprehensiveness, and in the technical standards they apply. Most importantly, however, they differ significantly in their usefulness and suitability for their purpose. To genuinely support

the advancement of an open society, legislative portals need to meet a range of legal, administrative, and technical requirements (Braunschweig et al., 2012).

To design, develop, maintain, and sustain an effective legal information retrieval system, it is essential to thoroughly understand its users, their needs, and their intended patterns of use, and to translate these insights into clear functional and non-functional system requirements. In theory, the legislative platform will be accessed primarily by legal professionals, and the extent to which its functionalities are utilized will depend on users' levels of experience and specialization in legal matters (Virkar et al., 2020). Often, only legal professionals can infer relationships and links between legal documents and understand cross-references within those documents by reading the text.

On the other hand, although legal information is publicly available, the documents published on legislative portals are often insufficiently linked and interconnected. In addition, documents and their associated metadata are commonly stored in separate databases, further limiting accessibility and effective use. (Filtz et al., 2021). Moreover, the large amount of information about laws and rules that currently apply remains fragmented and stored across multiple databases and inaccessible systems, mainly consisting of and presenting documents published in the national language (Virkar et al., 2020). The lack of integration often results in a tedious, time-consuming search for legal information across multiple databases. This problem becomes even worse when legal documents from other jurisdictions are involved, such as legislative acts from the European Union that influence and affect national law (Filtz et al., 2021).

The demands of the modern era have driven the continuous production of vast quantities of legal documentation, with the number of legal documents published online increasing exponentially. This growth is a direct result of advances in information technology and the accelerating momentum of the open data movement in Europe and beyond (Virkar et al., 2020). Nevertheless, pertinent legal information, embedded in large amounts of textual data available on the Internet, is becoming increasingly difficult to locate - even for expert users who cannot utilize text mining tools and techniques capable of extracting data from large repositories (Alexopoulos et al., 2024).

The relevance of legislative portals becomes evident when contrasted with traditional methods of accessing legal information. Outside of legislative portals, laws are typically consulted either in printed textbooks or through paid legal databases - available online or on-premises - operated by commercial legal publishers (Virkar et al., 2020). While legal textbooks remain

popular among less technologically inclined legal professionals, they generally cover only selected legislation within specific areas of law. Their continued use may partly be explained by the high cost of subscriptions to online legal databases, which many legal professionals are unwilling or unable to afford (Matt et al., 2023).

A typical legislative portal is expected to provide free access to national laws, legislative and other public documents of government bodies and holders of public authority in a country, and European Union laws and documents issued by the institutions of the European Union. In an ideal situation, the legislative portal can also be used to monitor the legislative process in a country and to search case law, enabling legal professionals to find relevant legal information more effectively (Alexopoulos et al., 2024). Consequently, a legislative portal is intended to be a unique technology-driven legal tool that publishes and contains up-to-date legal data and information.

A legislative portal is expected to provide access to legislation and case law in their original form, systematically organized and cataloged, and easily searchable, along with access to legal literature and various helpful online tools. As such, a legislative portal is an indispensable and essential tool for its users - legal professionals, judges, attorneys, notaries, corporate lawyers, legal scholars, and legal researchers (Virkar et al., 2020). This assumes that legal data is considered truly available when it is complete, downloadable, free of charge, and can be freely (re)used. According to Filtz et al. (2021), even a minimal set of standardized metadata can enhance the data exchange. Moreover, most current legislative portals tend to focus on a single dimension, rather than simultaneously addressing legal data quality, data portability (the ability to exchange data across platforms or services), and usability (ease of use) (Matt et al., 2023). Furthermore, the effective development of legislative portals requires strong governance to prevent gaps and to coordinate the activities and contributions of various stakeholders (Vancauwenberghe & Cromptvoets, 2018).

In any case, legislative portals have increasingly become the primary and most important source of legal information for all stakeholders on current and previous legislation, both in their own country and in other jurisdictions (Virkar et al., 2020). A substantial volume of open legal information in textual form is already accessible through the "first-generation" of national legislative portals - most of which are government-owned and operated - providing basic texts of laws, bills, and court decisions, often accompanied by limited or simple metadata (Alexopoulos et al., 2024). Countries publish their legislation in their official language(s), and it is legally binding only in those language(s). For informational purposes, certain acts of

national law may also be available in one or more additional languages other than their official language(s) (Costa et al., 2020).

The development of most first-generation national legislative portals was motivated by the need to overcome legal complexities and improve access to legislative information. While these portals provide basic functionalities for accessing legal documents, they are increasingly inadequate for addressing the evolving demands of legal practice. The globalization of economic activities, coupled with the growing complexity of national and international legislative frameworks, has created a need for more advanced legal information systems capable of supporting sophisticated legal research, analysis, and decision-making processes (Alexopoulos et al., 2024).

Additionally, merely publishing high-quality data on a legislative portal is not sufficient, as this can result in so-called "virtuous data dumps" (Alexopoulos et al., 2024). Equal attention must be given to how data are published, managed, and used, which requires understanding the needs of data professionals, as well as selecting appropriate tools to provide the functionality and user experience they need (Costa et al., 2020). Therefore, much of the current criticism of legislative portals stems from the perception that governments prioritize presenting data in a particular manner, which diverts attention from - and consequently limits - the broader provision of data that users are genuinely interested in (re)using for their own purposes (Máchová & Lněnička, 2017). Thus, despite the various advantages offered by legislative portals, their development entails significant uncertainty and complexity for public organizations. These organizations must decide how to provide access to extensive volumes of legal content while ensuring accuracy, usability, and compliance with open data principles. As a result, existing legislative portal systems vary considerably, and substantial potential remains for their improvement (Matt et al., 2023).

In recent years, a number of efforts have been made to develop advanced legislative portals designed to meet the complex legal information requirements and needs of contemporary legal practice. This need has grown increasingly critical due to the internationalization and globalization of economic activity, particularly within the demanding context of the European Union (Alexopoulos et al., 2024). Notably, legislative portals not only improve public access to the law by presenting legal information in a more contextualized and user-friendly manner, but they also serve as a central element of international "Open Government Data" initiatives, which aim to make government data freely accessible to a broader audience (Matt et al., 2023).

However, legislative portals are expected to provide legal content in an accurate and user-friendly digital format while fully leveraging the opportunities offered by open data, guided by key quality criteria across three interrelated dimensions: data quality, data portability, and usability (Matt et al., 2023). The objective of creating a large-scale, user-friendly legal information retrieval system is therefore not merely to consolidate dispersed legal data into a single meta-database, but to make the law fully accessible, understandable, and empowering for diverse legal experts (Virkar et al., 2020). Also, the quality of legal data is essential for the use of legislative portals, and a certain level of data quality is critical for open data (re)use (Máchová & Lněnička, 2017). Deficiencies in data quality - manifested as omissions, redundancies, or inaccuracies - undermine legal certainty and may lead to erroneous legal reasoning and decisions (Matt et al., 2023).

Matt et al. (2023) argue that the quality of legislative portals and data they provide is not merely a technical concern but a matter of legal certainty. Such portals must provide complete and authoritative access to legal provisions, including historical versions, to ensure that users can rely on the law. Normatively, official channels for the publication of legislation ought to be singular, distinct, and permanent, guaranteeing that access to legislation is both reliable and predictable. The data presented must be sufficiently detailed to fulfill contextual requirements of completeness and interpretation. Furthermore, legislative portals should be designed to integrate and reference legislative materials across all levels of governance (supranational, federal, state, and local) while linking preparatory documents, legislative records, and related materials, given their importance for understanding and applying the law (Máchová & Lněnička, 2017).

A advanced legislative portal aims to offer the following services to its users - legal professionals who need reliable legal information: (1) a cross-referenced collection of all the laws and regulations organized by subject, (2) consolidated texts of all the valid laws cross-referenced with the selected relevant courts' case law, (3) consolidated texts of all the valid regulations cross-referenced with selected relevant courts case law, (4) a timeline that presents both current and expired laws in the historical context with all of the individual versions of laws fully searchable, (5) the selected judgments and summaries of the judgments of Supreme Court, Constitutional Court or similar High Court cross-referenced with relevant legislation, (6) administrative decisions, (7) expert legal opinion and legal articles, and similar (Matt et al., 2023).

Ideally, all legal content would be centralized and accessible through a single legislative portal, functioning as a "one-stop shop" for legal information. However, this ideal remains far from

being realized in practice (Matt et al., 2023), although the latest advancements in legal informatics focus on making services more open and improving access to legal resources. Vikar et al. (2020) argue that the legal domain remains one of the most challenging areas for the application of automated text retrieval, since legal information retrieval relies primarily on underlying concepts rather than on the explicit wording of document texts (Alexopoulos et al., 2020).

Additionally, the primary challenge that researchers must address in the future is how to harness this "big open legal data" to create innovative, advanced, and sophisticated digital tools²⁵ to provide better services within the legal domain (Alexopoulos et al., 2024). The main objective needs to be to enable a rapid transition toward greater legal data sharing and transparency (Máchová & Lněnička, 2017) and to develop effective systems for legal information provision, incorporating advanced search and processing capabilities, underpinned by appropriate metadata, and facilitating the organization and annotation of large volumes of legal texts (Alexopoulos et al., 2020).

3.2.1. European Legislation Identifier (ELI)

The European legal system is highly complex and multi-layered, and since its inception, it has generated vast quantities of legal documentation. This complexity has significant implications for diverse actors who require regular access to accurate and timely legal information and must be able to navigate legal language effectively. EU member states are required to make legal content available online and to ensure that the public sections of their websites are accessible without barriers. This includes ensuring that content is perceivable, operable, understandable, and sufficiently "robust" to be interpreted by assistive technologies, among other requirements (Matt et al., 2023). In contrast, legislative portals providing large volumes of new types of legal information have become widely accessible. This highlights the importance of integrating these heterogeneous information sources to support more data-driven decision-making, with the

²⁵ Alexopoulos et al. (2024) explained that a prominent example of a legal portal designed to address challenges and cater to the highly complex demands for legal information across multiple national and international frameworks is the European ManyLaws project. The project has developed a suite of user-centric services that provide access to and visualization of cross-country, multilingual legal information and advanced value-added analyses, including comparisons of laws on specific topics across countries, temporal evolutions of legislation, identification of connections and conflicts among laws, and tracking of EU Directive transpositions. The project solution is based on a platform supported by the proper environment for semantically annotated Big Open Linked Legal Data (BOLLDD). The ManyLaws metadata schema is based on three standard ontologies, each of them describing a different class of elements of the document: the data catalog vocabulary (DCAT), the European Legislation Identifier (ELI), and the Akoma Ntoso (AKN).

availability of accurate and timely legal information remaining a crucial component of effective decision-making (Virkar et al., 2019).

In this context, the European Union has recently created the European Legislation Identifier (ELI), a harmonized framework designed to facilitate the online publication, retrieval, exchange, and reuse of legislative information across Europe.²⁶ Its purpose is to ensure that legal information can be easily accessed, exchanged, and reused across borders (Matt et al., 2023). It is developed collaboratively by the Member States of the European Union and EU institutions (Council conclusions 2017/C 441/05). ELI operates on the basis of a voluntary intergovernmental agreement and establishes a shared technical and semantic infrastructure for legal information.

Its architecture comprises three key components: Uniform Resource Identifiers (URIs): persistent, standardized identifiers that ensure stable access to legislative resources; structured metadata specifications: a common schema for describing legal information in a consistent and interoperable manner; and a machine-readable exchange language: a formalized syntax that enables automated processing, integration, and cross-border dissemination of legislative data.

The implementation of ELI generates several significant benefits for the production, management, and dissemination of legal information (Alexopoulos et al., 2024); higher-quality and more reliable legal data; the use of persistent identifiers and rigorously structured metadata significantly enhances the accuracy, coherence, and long-term stability of digital legislative resources, strengthened interoperability of information systems; ELI's standardized legislative structure facilitates seamless interaction among diverse national and European legal information systems, while remaining sufficiently adaptable to the specificities of individual legal traditions, improved accessibility and discoverability; optimized metadata and searchability increase public access to legislation, enabling broader use by citizens, legal professionals, researchers, and digital service providers, catalyst for innovation and value-added services; machine-readable, well-structured data support the creation of advanced analytical tools, legal informatics applications, and other user-oriented digital services, operational efficiency and cost reduction: more coherent information flows and reduced publication times lead to measurable administrative efficiencies and resource savings, enhanced transparency and democratic accountability; by improving the availability and

²⁶ ELI - European Legislation Identifier <https://eur-lex.europa.eu/content/help/eurlex-content/eli.html> visited 12/12/2025

traceability of legal information, ELI strengthens public oversight of legislative processes and contributes to more transparent governance. ELI is used to capture all references (inter-correlations) within a legal document and is increasingly adopted by European countries as an ontology for describing legal texts (Alexopoulos et al., 2024). In the future, the full and international adoption of the ELI standard could enable querying the legislation of all EU member states with a single search (Alexopoulos et al., 2024). In this context, legislative portals exemplify how ELI fosters the advancement of open data infrastructures and promotes the availability of high-quality legislative datasets.

4. Modeling an open data assessment framework for legislative portals

Over recent years, more and more governments have opened up the data they hold so that data can be used to improve transparency and government services and boost economic growth. As open data initiatives have grown in popularity, various efforts have emerged to assess different dimensions of open data, including readiness, implementation, outcomes, and overall impact (Davis, 2014). Experts in open data assessment have continually explored and discussed the creation of standardized methods and frameworks for studying and evaluating open data. Their goal has been to establish a common framework that enables researchers and policymakers to share ideas and definitions, generate comparable data, collaborate on the design of measurement tools and methodologies, and ultimately work together to strengthen the open data ecosystem (Davis, 2014).

This chapter commences with an overview of existing research and frameworks on open data measurement, aiming to identify the key questions concerning open data and open data portals that are addressed by assessment frameworks developed in recent years. Building upon this review, the latter part of the chapter focuses on identifying common categories and indicators within existing assessment frameworks that can be systematically applied to legislative portals.

4.1. Common methods for assessing open data - an overview of existing open data assessment models

Although there is considerable anecdotal evidence suggesting positive impacts of open data in practice, measuring its actual socio-economic impact remains challenging. Research indicates that the mere availability of more open data does not automatically result in greater transparency or a growth in value-added products and services based on open data (Welle Donker & van Loenen, 2017). A key challenge in the open data domain is how to effectively evaluate open data in general, as well as the platforms and infrastructures that provide it, including determining the appropriate benchmarks²⁷ or metrics for assessment. By benchmark,

²⁷ Benchmarking is a method used to assess and improve quality by comparing an organization's performance, processes, or services against established standards or best practices. It involves learning from others by evaluating performance, identifying strengths and weaknesses, and recognizing gaps between current results and desired outcomes. By drawing on the knowledge, experience, and successful practices of other organizations, benchmarking helps organizations set realistic improvement goals, make informed decisions, and develop innovative strategies to enhance operations. As a quality assessment tool, it supports continuous improvement, increases effectiveness and competitiveness, and contributes to overall organizational performance. Despite potential challenges, benchmarking remains a valuable and effective approach for evaluating and improving organizational quality and performance. The ultimate goal of benchmarking is to derive arguments for improving a particular situation (Lankford, W., 2002).

scholars refer to comparative assessments used to measure countries' progress in publishing and using open data, often forming the basis for ranking lists (Zuiderwijk et al., 2021).

A variety of open data assessment tools have been developed to describe and monitor the state of open data within countries and organizations, and to evaluate how effectively governments are performing (Welle Donker & van Loenen, 2017). These assessment frameworks serve multiple purposes, including benchmarking and cross-sector or cross-country comparisons, as well as supporting improvements in the quality and governance of open data by identifying implementation gaps and enabling accountability of public officials. Charalabidis et al. (2018) argue that the core of any open data benchmark should include the issues of sustainability of governance structures and processes.

Moreover, despite achieving high scores under these assessment frameworks, the actual (re)use of open government data often fails to meet expectations (Welle Donker & van Loenen, 2017). Each open data measurement tool adopts a distinct approach, methodology, and scope. Each tool has its own strengths and is suited to particular contexts and situations. Moreover, most of the key open data measurement tools are increasingly moving towards using established Open Data principles as the foundation and starting point for their assessments (Palmer, 2017). Nevertheless, despite the proliferation of numerous open data assessment frameworks worldwide, they often tend to focus on only a single perspective of the open data ecosystem; consequently, there is a clear need for a more holistic assessment framework that assesses and evaluates open data initiatives from multiple perspectives (Welle Donker & van Loenen, 2017).

4.1.1. Subjective and objective open data assessment models

The research area of open data is pretty extensive, making it essential to identify key focal points for assessment. Generally, when designing and creating an evaluation framework, it is important to determine both the aspects to be evaluated and the evaluation model to be applied. The model applied could be either subjective or objective (Charalabidis et al., 2018). There is a distinction between the subjective and objective models for evaluating open data based on the identified evaluation models from the domain of information systems.

Objective assessment models are based on predefined metrics and their corresponding values, which are used to assess performance against specific benchmarks related to the aspect under evaluation. In contrast, the subjective assessment model focuses on capturing

users' perceptions of the different aspects of the system, including perceived ease of use, perceived usefulness, and overall attitude (Miletić, A. et al., 2023).

Subjective and objective metrics may be integrated into the same evaluation model, enabling a more comprehensive assessment (Charalabidis et al., 2018). When developing an evaluation framework, both subjective and objective metrics and measures can be utilized since they capture different views of the platform or infrastructure under evaluation (Welle Donker & van Loenen, 2017).

4.1.2. Open data assessment models - different evaluation scope

Opening data by public organizations is a complex undertaking. Although many public organizations may be willing to make their data openly available, they often lack standardized guidance on how to do so effectively (Charalabidis et al., 2018). A readiness assessment framework seeks to evaluate an organization's preparedness to open its data for reuse, as well as the status of the data in terms of format, licensing, and means of provision that enable effective reuse. Such frameworks address organizational issues and encompass the processes of the open data lifecycle leading up to publication (Kutnjak et al., 2021). They may also support decision-making regarding whether data should be opened or published under restricted access conditions (Charalabidis et al., 2018; Welle Donker & van Loenen, 2017). Furthermore, readiness assessments can offer solutions for handling privacy-sensitive data, including deletion policies or delayed publication following embargo periods, rather than opting not to publish the data at all. An example of such an approach is the Open Data Readiness Assessment tool developed by the World Bank (Charalabidis et al., 2018).

The impact of opening up data is frequently discussed as a primary motivation for publishing open data, with its economic and democratic benefits widely regarded as key drivers for increased data release (Charalabidis et al., 2018). However, quantifying the actual impact of open data on business and society remains challenging. To date, impact measurement efforts have struggled to produce concrete evidence regarding the effectiveness of open data initiatives (Zuiderwijk et al., 2021). Simply making data available does not automatically ensure that the public can use it meaningfully or that businesses can potentially gain profit using it (Charalabidis et al., 2018). Existing approaches to impact measurement have largely focused on two large groups of metrics: quality, usage, and access, and results-based metrics. Effective impact metrics, therefore, need to capture both the economic and political benefits of open data, while also accounting for how these benefits are distributed (Charalabidis et al., 2018; Zuiderwijk et al., 2021).

Three significant approaches for measuring this impact, depending on the level at which measurement occurs, can be outlined: In macro-level approaches, the researchers assume that opening data should positively affect the economy and society. Therefore, measurement and assessment should take place at the aggregate level (Charalabidis et al., 2018). Meso-level approaches examine the impact of open government data within a specific sector. Micro-level approaches focus on particular datasets or dataset groups and follow them through their lifecycle (Charalabidis et al., 2018; Zuiderwijk et al., 2021). By doing this, a complete picture of usage, impact, and benefit distribution can be provided.

Other aspects of evaluation could be the data maturity model. Thus, it appears necessary to review open data maturity²⁸ (how well established a process is) since measuring open data maturity can be a way to drive a culture of continuous improvement. In the open data domain, maturity is defined as a measurement of the ability of an organization or a country to improve constantly. The higher the maturity, the greater the probability of transforming incidents into improvement either in their quality or use (Charalabidis et al., 2018; Welle Donker & van Loenen, 2017).

4.1.3. Open data assessment models - different evaluation perspectives

In recent years, a number of international open data assessment frameworks have been developed, with most focusing on the implementation of open data strategies (Welle Donker & van Loenen, 2017). Governments and organizations can use these assessment tools to evaluate and monitor their progress.

- The Open Government Data Working Group of the World Bank developed the Open Data Readiness Assessment tool (ODRA). This tool can be used to carry out an assessment of how ready a government or individual agency is to evaluate, design, and implement an open data initiative. The ODRA covers the initial stage of the open data process and focuses solely on assessing the various aspects of readiness (Susha et al., 2015). In addition, the tool aims to

²⁸ Since 2015, the European Commission, with the support of Capgemini Invent and its partners, has conducted an annual assessment on EU countries' open data maturity. Capgemini conducted a study on the European Data Portal, developing a maturity model to evaluate the development of data portals across EU countries, highlighting the significant differences in the progress made in open data among these countries. To account for these variations, the study introduced a model to classify countries based on their open data maturity. The open data maturity assessment measures EU countries' progress in promoting and facilitating the availability and re-use of public sector information. It evaluates maturity across four dimensions: (1) the development of national policies supporting open data; (2) the features and datasets available on national data portals; (3) the quality of metadata on these portals; and (4) initiatives aimed at monitoring the reuse and impact of open data.

2024 Open Data Maturity Report https://data.europa.eu/sites/default/files/odm2024_full_report.pdf

assist government authorities in planning actions necessary to establish an open data program (Vancauwenberghe et al., 2018).

- The Open Data Institute developed the Open Data Certificate, a free online tool designed to assess and recognize the sustainable publication of high-quality open data. The tool evaluates legal, social, practical, and technical aspects of open data publishing in accordance with best-practice guidelines.
- The Open Data Institute also developed the Open Data Maturity Model, a framework to assess how well an organization publishes and consumes open data, and identifies actions for improvement.
- Tim Berners-Lee created the 5 stars of linked open data to assess how easy it is to connect a specific dataset to other datasets. After the publication of the eight principles of open government data, the "5 stars" model was the first objective index. Tim Berners-Lee suggested a 5-star deployment scheme,²⁹ starting at one star, with data getting more stars when proprietary formats are removed, and links are added.
- Periodic Table of Open Data's Impact Factors is based on the existing literature and case studies. GovLab developed an approach outlining the enabling conditions and disabling factors that often determine the impact of open data initiatives (Palmer, 2017).

Although the primary aim of benchmarking is to assess the state of open data across different countries, existing benchmarks vary considerably in scope and focus. Each benchmark has been developed to serve a distinct purpose with a varying degree of specificity (Susha et al., 2015). This diversity can be partly attributed to the fact that open data remains an emerging field.

Below, selected open data assessment models are summarized and critically discussed:

1. Open Knowledge International (OKI) developed a *Global Open Data Index*.³⁰ The Open Data Index tracks the state of open government data and measures it annually to evaluate which countries are publishing data in the right way and in a timely manner. The Open Data Index provides actual openness levels of data published by governments based on feedback given by citizens and organizations worldwide (Marković et al., 2016). Some benefits of using the Open Data Index are: it provides a citizens' perspective on data openness, compares dataset groups across countries, helps citizens learn about open data and available datasets in their countries, and

²⁹ Tim Berners-Lee's 5 Stars principles of Linked Open Data: 1. make your stuff available on the Web (whatever format) under an open license; 2. make it available as structured data (e.g., Excel instead of image scan of a table); 3. use non-proprietary formats (e.g., CSV instead of Excel); 4. use URIs to denote things, so that people can point at your stuff; 5. link your data to other data to provide context. 5-star Open Data <https://5stardata.info/en/> visited on 02/01/2026

³⁰ Tracking the state of open government data by Open Knowledge [Global Open Data Index](#)

tracks changes in open data over time. During an assessment of the data,³¹ some assumptions were taken into consideration: open data is defined by the Open Definition³²; governments are responsible for data publishing; government, as a data aggregator, is accountable for publishing open data by all its sub-governments (Marković et al., 2016). Scoring for each dataset is based on an evaluation consisting of nine questions.³³ Although the Open Data Index considers a wide range of government data, only legislation data is tracked in the legal domain (Marković et al., 2016; Zuiderwijk et al., 2021). As the Open Data Index exclusively measures data sets' availability and openness, it is the most supply-oriented benchmark of all benchmarks. This independent assessment is conducted from a civic perspective and focuses solely on data publication, without addressing data quality, usage, or the impacts generated from the data. Although the project is no longer active, the methodology underpinning the assessment remains available on its website (Miletić et al., 2023).

2. *The Open Data Barometer*, developed by the World Wide Web Foundation, is a global measurement initiative designed to assess the actual impact of open data initiatives worldwide, focusing on accountability, innovation, and social impact (Miletić et al., 2023). The Open Data Barometer³⁴ adopts the most comprehensive perspective, encompassing measures across all key stages: readiness, implementation, and impact (Welle Donker & van Loenen, 2017). The Open Data Barometer examines global trends in open data, aiming to provide a global view that considers both countries with established successes and those where open data is still emerging (Susha et al., 2015). It provides comparative data on open data initiatives in different countries and regions³⁵ (Vancauwenberghe et al., 2018). The Open Data Barometer is a goal-oriented tool that can be used to understand how to tailor implementation to achieve a particular impact (economic, social, or political). This tool offers insights into the maturity of open data governance exclusively from the perspective of data providers (Miletić et al., 2023).

³¹ Datasets considered by the Open Data Index are national statistics, government budget, government spending, pollutant emissions, election results, national map, legislation, company register, land ownership, location datasets, government procurement tenders, water quality, and weather forecast.

³² 'Open Definition 2.1'. <http://opendefinition.org/od/2.1/en/> visited 12/12/2025

³³ Questions and their scoring weights (in brackets) are as follows: 'Does the data exist?' (5); 'Is data in digital form?' (5); 'Publicly available?' (5); 'Is data available for free?' (15); 'Is data available online?' (5); 'Is the data machine-readable?' (15); 'Available in bulk?' (10); 'Openly licensed?' (30); and 'Is the data provided on a timely and up to date basis?' (10). (Marković et al., 2016).

³⁴ The methodology was last updated for the 2018 assessment [Methodology - Open Data Barometer](#) visited 12/12/2025

³⁵ The Open Data Barometer based its ranking on three types of data: peer-reviewed expert survey responses (country experts answer questions related to open data in their countries), detailed dataset assessments (a group of technical experts gives an evaluation based on the results of a survey answered by country experts), and secondary data (data based on expert surveys answered by World Economic Forum, Freedom House, United Nations Department of Economic and Social Affairs, and World Bank) (Marković et al., 2016).

3. *The European Public Sector Information (PSI) Platform* created the PSI Scoreboard, a crowd-sourced tool designed to assess the state of open data and PSI reuse across the European Union. The PSI Scoreboard provides a specific snapshot of the European open data landscape (Susha et al., 2015) and emphasizes the legal regime governing the publication and use of open data in each country. It evaluates seven dimensions of PSI reuse, based on 25 specific indicators. While the PSI Scoreboard primarily examines the implementation of the PSI Directive, it also considers other factors, such as the availability of local government data and initiatives promoting open data (Welle Donker & van Loenen, 2017). The Scoreboard does not include other governance aspects or the user's perspective.
4. Capgemini Consulting developed the *Open Data Benchmark*. The Open Data Benchmark researches open data portals in the European Union and assesses data availability and data portal usability from the data provider's perspective (Welle Donker & van Loenen, 2017). The tool measures the ease of use of data portals, namely, discoverability of data and the functionalities for user interaction online (Susha et al., 2015). The Open Data Benchmark only surveyed the countries where open data efforts had already been initiated (Susha et al., 2015). It includes one readiness aspect that assesses the implementation of data publishing practices and data quality, and refers to the ease of reuse and user participation as preconditions for emerging impacts (Susha et al., 2015). The Open Data benchmark has the most specific purpose of offering expert advice on achieving the economic value of open data. Finally, the tool has limited relevance due to its lack of transparency. Still, it is a practical tool to help public managers understand the interplay between supply and demand and how to set up basic interaction at an open data portal (Susha et al., 2015). The Open Data benchmark overlooks the organizational transformation that should accompany the technical infrastructure for open data, thereby sending false signals to countries attempting to improve their rankings (Susha et al., 2015). In addition, Capgemini developed a maturity model for European Union countries for portal development (Charalabidis et al., 2018). The Open Data Maturity Report records the progress achieved by European countries as they push forward open data publication and reuse, and the different priorities they have set to enable it. Based on the scores on several indicators, countries were compared in terms of their maturity. A country can be classified as being either a trendsetter, follower, advanced beginner, or beginner (Charalabidis et al., 2018).
5. At the organizational level, a good example is the United Kingdom Open Data Institute, which developed a Maturity Framework. *The Open Data Maturity Model* is a way to assess how well an organization publishes and consumes open data and identifies

actions for improvement. The model is based around five themes and five progress levels to assess and monitor organizational performance (Miletić et al., 2023). Each theme is broken into areas of activity, which can then be used to assess progress.³⁶

The diversity of benchmarks can be attributed to the global development of open data initiatives and the emerging nature of the open data field (Susha et al., 2015; Zuiderwijk et al., 2021). These initiatives are developed by a wide range of organizations with differing objectives, scopes, and definitions of open data, leading to benchmarks with varying, non-identical focuses. Although there is often overlap, particularly in the assessment of datasets, each benchmark is designed with a specific purpose and reflects different levels of specificity, scope and focus, and views open data maturity differently (Zuiderwijk et al., 2021). Many frameworks evaluate open data from a particular perspective, such as the types of data released, the performance of open data portals, or compliance with open data policy commitments, thereby offering valuable insights (Welle Donker & van Loenen, 2017). Some frameworks also focus on specific outcomes, such as government transparency. However, most benchmarks tend to generate generic or ambiguous results for any particular organization, emphasize the supply side of open data, and include only limited measures related to data use and demand (Susha et al., 2015). The selection of an appropriate method for assessing open data maturity should be guided by the specific context and objectives of the open data initiative (Susha et al., 2015).

Many existing assessment frameworks tend to adopt a narrow focus, primarily concentrating on data supply and the surrounding data environment (Welle Donker & van Loenen, 2017). Building on this observation, Welle Donker & van Loenen (2017) further argue that, despite the proliferation of open data assessment frameworks worldwide, most of these models address only a single perspective of the open data ecosystem. To overcome this limitation, they propose a holistic framework that simultaneously assesses open data supply, open data governance, and open data user characteristics. According to Welle Donker & van Loenen (2017), identifying and evaluating the success factors of open data initiatives requires a multidimensional approach. The holistic open data framework evaluates the maturity of the entire open data ecosystem, making it a valuable tool for identifying both successful aspects and areas that require further attention and improvement.

The following conclusions can be drawn: the measurement of open data benchmarks should encompass multiple levels, including open data policies, readiness, implementation, adoption, and impact (Welle Donker & van Loenen, 2017). In addition, assessments should address

³⁶ [Open Data Maturity Model | The ODI](#) visited 02/01/2026

various aspects of the open data ecosystem, including open data publication, organizational transformation, and related factors (Susha et al., 2015). Importantly, these benchmarks should not only assess the current state of open data initiatives but also provide guidance for improving existing practices. To remain relevant in a rapidly evolving open data landscape, benchmarks require regular revision and ongoing research (Susha et al., 2015). Moreover, open data measurements reflect a country's image and position within the digital environment. Measuring progress is therefore essential, as such assessments offer credible insights into national strengths and weaknesses and can serve as powerful incentives for continued advancement (Susha et al., 2015).

4.2. The development of the specific open data assessment framework for legislative portals

In contemporary society, legal information represents one of the most important sources of open data. Policy-makers, legal experts, and legal professionals constitute key user groups with sustained interest in this type of data (Alexopoulos et al., 2021). To encourage the provision, use, and reuse of legal data and to unlock its potential benefits, numerous legislative portals, both non-proprietary and proprietary, have been developed to provide access to legal data and documents. Within this evolving landscape, it is essential to examine how these portals complement and relate to one another, particularly in terms of the core services they offer and the extent to which they use additional tools for data description to support more advanced services. So far, existing research has largely focused on assessing open data quality or evaluating the portals offering open data (Charalabidis et al., 2018).

In general, evaluating an open data initiative or portal remains challenging (Kutnjak et al., 2021). First, there are no objective and universally accepted metrics or benchmarks for assessment. Second, evaluation can be approached from multiple perspectives, each offering different insights (Charalabidis et al., 2018). Moreover, a systematic analysis of legislative portals is largely absent from the existing literature (Alexopoulos et al., 2021).

In response to this gap, this paper proposes a specific open data assessment framework for comparing legislative portals and the legal data they provide, and applies this framework to assess and compare several legislative data portals. The proposed assessment framework builds upon previously analyzed existing open data assessment models, adapting the framework to the specific characteristics of legislative portals and legal data they publish. Building upon this review, the paper focuses on identifying common categories and indicators within existing assessment frameworks that can be systematically applied to legislative portals.

Ultimately, the paper aims to evaluate the readiness of the open legal data ecosystem to support the provision and reuse of high-quality open data.

4.2.1. Legislative portals methodological approach and the analysis framework

For the purpose of this paper, the assessment primarily relies on an objective model, complemented by some selected subjective indicators. Both objective and subjective metrics are employed, because they capture different perspectives of the legislative portals under evaluation (Charalabidis et al., 2018). Legal data are examined as a specific category of open data that are created, published, used, linked, and reused.

The proposed framework has been developed to examine a range of different functionalities. The analysis scrutinizes specific aspects of national legal systems: the presence of an official gazette issue or other more sophisticated types of legislative portals; open data policies and governance structures; the types and categories of datasets offered and their quality; data availability; the underlying technologies supporting the functionality of portal; the interoperability standards adopted; and the services delivered to end users supporting the development of an ecosystem. The proposed open data assessment model evaluates the progress of legislative portals across four key dimensions, each representing a different aspect and indicators: policy and governance, quality, availability, and portal. The definitions of the four key dimensions are summarized in Table 7.

Table 7: *Dimensions of the proposed open data assessment model and their indicators*

Dimension	Description
Policy and Governance	Focus on open data policies and strategies for legislative portals, as well as on organizational structures and funding mechanisms. The following dimensions covered: the requirements and obligations for data publication; the legal and regulatory framework governing open data - making sure that the collection and sharing of data is governed by legitimate public rules; the level of political commitment supporting open data publication; the presence of regulatory and institutional support mechanisms; the organizational structures and capacities established to implement policy objectives - including data management, data protection, data sharing and open data practices - and the availability of sustainable financing to support open data activities. This dimension covers: policy framework, governance of open data, and open data implementation.
Data Quality	Evaluate the measures implemented by legislative portals to ensure the systematic harvesting of metadata, the monitoring of metadata quality and compliance with the DCAT-AP standard, and the overall quality of data publication and presentation on the legislative portal. The main focus is on the mechanisms and processes in place to ensure the quality of data and metadata. This dimension provides an overarching incentive for portal managers to ensure that open data on legislative portals is published in appropriate formats with correct licensing, is machine-readable, of high quality, and suitable for a linked

	data approach. This dimension includes: metadata completeness, monitoring and measures, DCAT-AP ³⁷ compliance, and deployment quality and linked data.
Data Availability	Examine that open data is made available in digital, machine-readable, and non-proprietary formats, either free of charge or at no more than the cost of reproduction, and under explicit terms that permit reuse rather than restrictive copyright conditions. The assessment will survey the presence, openness, and key characteristics of selected datasets in order to evaluate the extent to which legislative portals are providing key datasets accessible in structured online formats that are fit-for-purpose and support public interest. This dimension involves technical openness, pricing model, open licensing, and download (both data & metadata).
Portal	Focus on assessing the functionalities and features of legislative portals that enable users to search and access datasets and download open data. It examines the extent to which users' needs and behaviors are analyzed to improve portal functionalities and features, the availability of open data across different domains, and the approaches adopted to ensure the portal's long-term sustainability. This also covers monitoring portal traffic (e.g., the number of unique visitors and dataset downloads), implementing measures to optimize the searchability and discoverability of both data and editorial content, and ensuring that metadata is presented in clear, plain language to enable comprehension by both human users and machines. This dimension encompasses: portal features, portal usage, and portal sustainability.

Source: Author based on Charalabidis et al., 2018; Alexopoulos et al., 2020.

The paper approach consists of the following steps. First, legislative portals are identified based on a set of predefined selection criteria, which ensure: (a) the inclusion of non-proprietary legislative portals at the national level; (b) coverage of legislative portals from two other European Union member states; and (c) representation of all major categories of legal data, including laws, bills, and case law.

Next, the composition of the framework for analysis is developed, specifying the key aspects of analysis. The proposed framework is drafted and constructed by integrating open data requirements with the commonly used methodological approaches identified during the literature review. The proposed approach builds also on the perspective introduced by Zuiderwijk et al. (2013), who categorized the requirements of the open data process into twelve distinct categories, providing a structured foundation for analyzing legal data published by legislative portals: 1) access, 2) searching, 3) navigation, 4) uploading, 5) downloading, 6) data quality, 7) analysis of datasets, 8) visualization, 9) linking and combining data, 10) collaboration, 11) support and help, and 12) feedback. These aspects of the process produce similar requirements for legal open data platforms. Using a proposed open data assessment

³⁷ The Data Catalog Vocabulary (DCAT) for the RDF data model provides guidelines and specifications for describing datasets in data catalogs to improve the visibility and interoperability of datasets on the web. It is a globally applicable standard, independent of any political or regulatory framework. DCAT is supplemented with application profiles tailored to the specific needs of various data portals. The DCAT-AP Application Profile is used as a specification for describing linked public data in Europe. This profile is based on the DCAT standard and offers additional guidelines and constraints to ensure compliance with European requirements (Žnideršič et al. 2025).

model, this research evaluates the progress of legislative portals across four main dimensions while also analyzing the functionalities and features of selected legislative portals that provide access to legal materials, focusing on their capabilities for legal data publishing and processing. For each evaluated functionality, a set of predefined response options is established, and the corresponding evaluation criteria are applied. An overview of the proposed framework, including a detailed description of each indicator of the four main dimensions that will be applied to the selected legislative portals, is provided in Table 8. A detailed overview of the proposed framework is presented and described in the Annex to this paper.

Table 8: *Four main dimensions, including a detailed description of each key indicator*

Dimension	Indicator	Key aspects
1. Policy and Governance	1.1. Policy framework	An open data policy and strategy are in place at the national level to provide a long-term strategic vision and action plan for open data. The policy incentivizes open data reuse and access to real-time data. Activities regarding high-value datasets are in place. Open data awareness exists at all levels in the organization.
	1.2. Governance of open data	Governance models and regular coordination activities are in place to ensure open data publication and to support open data initiatives. The existence and nature of a specific legal instrument establishing the legislative portal, the identification of the responsible government body and its organizational structure, the lines of accountability for portal management, the organizational structure of the publishing entity (including whether the publisher is a public or private company), and the sources of funding, specifying whether the portal is financed through the national budget or alternative mechanisms.
	1.3. Open data implementation	Data publication plans and implementation processes are in place, encompassing whether the legislative portal has an organizational open data strategy with clearly defined processes, responsibilities, timelines, and resources; the level of commitment to publishing open data; type of information and coverage, the standardization of the data publication process and the presence of a licensing scheme; whether the legal framework promotes free access to data (no or marginal costs); and whether procedures for anonymizing personal data have been established.
2. Data Quality	2.1. Metadata timeliness and completeness	A systematic approach is implemented to ensure that metadata remains up to date. Automated harvesting programs are employed to capture changes at the source and reflect them on the legislative portal with minimal delay. The portal offers access to a wide range of both historical and contemporary data.

	2.2. Monitoring and measures	Mechanisms are in place to monitor metadata quality on the legislative portal and compliance with required standards and licensing. Measures are in place to publish high-quality metadata and select the appropriate license for the data.
	2.3. Metadata quality and compliance with the required standard	A model is used to assess the quality of data and metadata deployment, observing the percentage of published open data that meets specific deployment quality requirements, such as including links to other data sources, with improvements monitored over time. Compliance with required standards is also systematically tracked (e.g., RDF Compliance).
3. Data Availability	3.1. Availability of data (Technical Openness)	The extent to which data is made accessible in ways that enable easy discovery, access, use, and reuse from a technical standpoint. It focuses on how data is published. Technically open data is: publicly accessible online without restrictive barriers (e.g. no mandatory registration or proprietary software); machine-readable, provided in structured, non-proprietary formats (such as CSV, JSON, XML); downloadable in bulk, with stable URLs or Application Programming Interface (API) services that allow automated access; well-documented, including metadata, data dictionaries, and update information to support correct interpretation and reuse; interoperable, using common standards and identifiers to allow integration with other datasets.
	3.2. Availability of data (Pricing model)	The extent to which data is made available free of charge or under cost structures that do not restrict access or reuse.
	3.3. Data completeness and data search function	The extent to which a dataset includes all relevant records, attributes, and time periods needed to fully represent the subject it covers. An effective open data search refers to tools and features that enable users to easily discover and locate datasets within an open data portal (data indexing, search capabilities, multiple field search, filter options).
4. Portal	4.1. Portal functionalities and features	Portal features ensure access to datasets and relevant content and often include more advanced features such as discussion forums, mechanisms for requesting datasets, and transparency into the status of requested datasets. Also, this covers whether data are available in both the national language and English (multilingual data), and assesses the platform's capabilities for dataset linking and visualization, the consistency and clarity of the user interface and visual hierarchy, and the availability of user support mechanisms, including FAQs, tutorials, guidance materials, and navigational assistance.
	4.2. Portal usage	Traffic to the portal is monitored, and analytics tools are used to gain insights into users' behavior and the most and least consulted data categories.
	4.3. Portal Sustainability	A strategy to ensure the sustainability of the portal has been determined. User surveys are conducted regularly and feed into a review process to improve the portal.

Source: Author based on Charalabidis et al., 2018; Alexopoulos et al., 2020.

Finally, the forthcoming chapter undertakes a systematic examination of the selected legislative portals and legal data they disseminate, guided by the proposed assessment framework. Within the methodology, the measurement model is also constructed and evaluated according to predefined categories. The insights gained through this analysis provide the foundation for the discussion of the findings, which are presented in the subsequent sections of this paper.

5. The application of the proposed assessment framework on legislative portals

The expansion of open data platforms, including legislative portals, has significantly expanded access to legal open data. Nevertheless, effective open data publication cannot be measured solely by the volume or quality of the data released. Rather, data must be made available in formats and under conditions that facilitate meaningful reuse and support value creation.

This chapter analyzes and evaluates open data publication practices within legislative portals, comparing the national legislative portal with two other European counterparts. It begins by identifying relevant legislative portals on the basis of predefined selection criteria. It then examines their policy and governance frameworks, including legal foundations, key policy aspects, institutional arrangements, management practices, and funding models. Next, an assessment framework aligned with established open data evaluation models is applied to the selected legislative portals to assess and compare the legislative portals across specific dimensions, with particular emphasis on governance, data availability, and data quality, with limited consideration of user experience. Finally, each chosen assessment dimension element is evaluated using the predefined measurement model, constructed according to predefined categories and corresponding analytical criteria. The evaluation employs a multi-level scale, enabling a standardized assessment of the model's different dimensions.

5.1. Croatia - the main features of governance of legislative portals and the application of the proposed assessment framework

In the field of open data governance, the central legislative rule is the Right of Access to Information Act. The Act establishes the obligation for public authorities to ensure that information under their control is published in a timely, transparent, and easily accessible manner, while also providing the legal framework for the reuse of such information. Moreover, the Act defines mechanisms for monitoring and protecting the right of access to information and imposes a statutory duty on public authorities to publish open data on the national open data portal in machine-readable, standardized formats. The scope of application of the Act extends to all public authorities at all levels of governance, including public undertakings. The Act further obliges public authorities to publish high-value data in machine-readable formats, ensuring accessibility via appropriate Application Programming Interface (API) services and enabling bulk download.

The principal implementing regulations of the Right of Access to Information Act are the Ordinance on the types and content of licenses laying down conditions for the reuse of

information, which specifies the categories of licenses and the conditions governing the reuse of information held by public sector bodies, and the Decree on Costs for the Re-use of Information, which regulates the fees that may be charged for the reuse of such information.

In 2018, the Government of the Republic of Croatia adopted the National Open Data Policy with the objective of ensuring maximum openness of public sector information. The Open Data Policy establishes a comprehensive framework outlining the principles and objectives for the opening and reuse of public sector data, provides general guidelines for the further development of openness and transparency of public data, and prescribes ways to ensure the availability of high-value datasets.

Furthermore, during 2022, Croatia transposed the Open Data Directive (Directive EU/2019/1024), which places particular emphasis on high-value datasets. In May 2025, the Government of the Republic of Croatia adopted a new Open Data Policy³⁸, setting a clear strategic direction for strengthening openness and transparency in public administration. Building on the Open Data Policy adopted in 2018, the 2025 Open Data Policy updates and expands Croatia's approach to open data by aligning with the European Union and national legal frameworks, promoting transparency and innovation, creating the basis for fair, accessible, and effective access to the data of public authorities, and introducing measures to ensure the availability of high-value datasets. As a result, Croatian public authorities are obliged to publish, in machine-readable format (CSV, XLS, XML, JSON, HTML, etc.), registers and databases they have created within their jurisdiction and for which there are no legal restrictions. In addition, public authorities are also obliged, regardless of the characteristics of the dataset, or even if there are legal restrictions, to publish a list of registers and databases within their jurisdiction (the so-called asset list), along with metadata and information on how to access or reuse them (e.g. open data, partially open data, data accessible only to a specific circle of authorized persons, etc.).

5.1.1. Croatia - the Official Gazette of the Republic of Croatia (Narodne novine)

Narodne novine was registered in 2000 as a joint-stock company wholly owned by the Republic of Croatia (100% ownership), pursuant to a special regulation - The law on restructuring the public company Narodne novine - continues to constitute the legal basis for the publication of legislation in Croatia. The company's core activities include, inter alia, the publishing and printing of the Official Gazette of the Republic of Croatia. The company operates as the official

³⁸ Open Data Policy <https://mpudt.gov.hr/open-data-policy/30146> visited 14/12/2025

gazette publisher of the Republic of Croatia, responsible for publishing laws, regulations, and other official acts, as well as providing printing, publishing, and related commercial services. The company's operations are organized into three principal business segments: publishing, printing, and trade. Although wholly state-owned, Narodne novine performs activities of public interest while simultaneously operating under market conditions, in accordance with the Croatian company law and applicable regulatory requirements.

Pursuant to the Act on Instruments of Better Regulation Policy, Narodne novine holds the status of the Official Gazette of the Republic of Croatia and is responsible for the publication of laws, regulations, official acts, and other legal instruments, thereby ensuring their public accessibility and availability. It is designated and constitutes the official source for the promulgation of laws, ordinances, decisions, and other regulations of the Republic of Croatia, and serves as the official journal in which publication constitutes a mandatory prerequisite for the legal validity, entry into force, and enforceability of the aforementioned acts and regulations in accordance with the principles of legal certainty and the rule of law. In this regard, Article 31 of the Act on Instruments of Better Regulation Policy expressly stipulates that laws and other regulations must be published in Narodne novine prior to their entry into force.

The Act further provides that the Legislation Office, as a professional service of the Government of the Republic of Croatia, is responsible for coordinating and ensuring the application of the instruments of better regulation policy. Within this framework, the Legislation Office of the Government of the Republic of Croatia is competent and responsible for preparing laws, regulations, and other legal acts for publication, as well as for ensuring the timely publication of all laws, regulations, and acts submitted for publication in the Official Gazette of the Republic of Croatia. In addition, the Legislation Office is responsible for overseeing the publication of corrigenda, including corrections of typographical and technical errors, thereby safeguarding the accuracy of published legal texts.

The Legislation Office, as a professional service of the Government of the Republic of Croatia, is established pursuant to the Act on the Government of the Republic of Croatia. The same Act provides that the Legislation Office shall be managed by a Director, appointed by the Government of the Republic of Croatia upon the proposal of the Prime Minister, following a previously conducted public competition. The scope of competence of the Legislation Office is further regulated in detail by the Regulation on the Legislation Office.

The Act on Instruments of Better Regulation Policy also sets out, in Article 32, the rules governing the publication of acts. The Editor-in-Chief of the Official Gazette is the Director of

the Legislation Office, who, in that capacity, adopts the Rules on the Publication of Laws, other regulations, and acts in Narodne novine - the Official Gazette of the Republic of Croatia, which govern the tasks required for the purposes of preparation and timely publication of laws, other regulations, and acts in Narodne novine - the Official Gazette of the Republic of Croatia. Laws, other regulations, and acts for which publication is prescribed must be published in the Official Gazette prior to their entry into force, and Article 2 of the Rules specifies the list of laws, other regulations, and acts that are required to be published in the Official Gazette.

The publishing activities of Narodne novine, in its capacity as the Official gazette of the Republic of Croatia, encompass the preparation, editing, and publication of the printed edition of Narodne novine (Official Gazette of the Republic of Croatia), the preparation, editing, and publication of the printed edition of International Treaties of the Republic of Croatia, as well as the editing and maintenance of the electronic editions of Narodne novine, International Treaties of the Republic of Croatia, and the Electronic Public Procurement Gazette of the Republic of Croatia. The content of Narodne novine includes newly enacted legislation, consolidated versions of laws, regulations, decisions adopted by public administration bodies, and rulings of the Constitutional Court.

The funding of Narodne novine reflects its dual role as both a provider of public-interest services and a market-oriented state-owned enterprise. As a joint-stock company wholly owned by the Republic of Croatia, Narodne novine generates revenue through its commercial activities, including publishing, printing, and trade-related services performed under market conditions. These activities enable the company to finance a substantial part of its operations independently.

At the same time, insofar as Narodne novine performs statutory public-interest functions - the publication of the Official Gazette of the Republic of Croatia - its activities are carried out within a legal and institutional framework defined by the state. Funding arrangements for these functions are determined in accordance with applicable regulations and state budgetary mechanisms, ensuring the continuous, reliable, and timely publication of laws, regulations, and other official acts. This hybrid funding model seeks to balance the principles of financial sustainability, public service provision, and compliance with Croatian company law and relevant public finance rules.

Narodne novine, as the official publisher of the Official Gazette of the Republic of Croatia, plays a central role in disseminating legal and regulatory information. Its operations directly support the implementation of the Open Data Policy and the broader framework governing access to

public sector information, ensuring that laws, regulations, and other general acts are publicly accessible and reusable. In accordance with Croatian legislation on the right of access to information and the reuse of public sector information, as well as with relevant European Union law, Narodne novine helps ensure that legal and regulatory data are made publicly available in an open, transparent, and non-discriminatory manner.

In practice, Narodne novine provides up-to-date versions of legal instruments in both print and digital formats. The online version is updated a day after the paper version is issued, generally twice a week, sometimes more often. With digital dissemination of legal acts, Narodne novine ensures required compliance with European Union requirements for the reuse of public sector information.

The primary purpose of Narodne novine is to provide the public with transparent, efficient, and free access to regulations and other general acts in force or applicable within the territory of the Republic of Croatia. To this end, access to online data within the Narodne novine database is simple and straightforward, fast, and reliable, utilizing standard Internet protocols. The service is available to everyone, anonymously and free of charge.

In Croatia, the Official Gazette publishes legislation exclusively in the state's official language – Croatian; only those linguistic versions possess legal authenticity and binding legal effect. Everyone can access, without registration and for free, all published documents in the editions of Narodne novine, which encompass official and international acts. Users can retrieve all documents from a selected edition, all documents published within a specific period, and a list of all editions. It is possible to access documents directly through unique URLs, which have been maintained on the Croatian internet for more than fifteen years. Most documents published from 1990 to the present time are available in HTML format, allowing viewing within the interface or printing. Certain documents from 1990 to 2022, particularly those unsuitable for HTML due to size (e.g., the state budget), are available in PDF format. Since 2023, all documents in the official and international sections have been accessible in both HTML and PDF formats, and a PDF version of the complete published editions is also provided.

Additionally, documents can be searched using keywords, phrases, or Boolean expressions, either in titles or within the text content. It is possible to search the websites of the Official Gazette using a term, date of announcement, type of announcement, or specific area of announcement (e.g., exchange rate).

For users who require a systematic review of a large number of documents from the official section, it is possible to retrieve both term and chronological indexes for selected years, as well as download all regulations for a given year in XLSX or CSV format. Access is also provided for search engine indexing. Any internet crawler seeking to index and utilize the content of Narodne novine can retrieve cascading sitemap files in the standardized XML format, enabling the discovery and indexing of the entire database. All available and published content is indexed. The primary sitemap can be accessed at: <https://narodne-novine.nn.hr/sitemap.xml>. This main XML file is further branched into smaller XML records, each corresponding to a specific release of the official edition. For example, the address https://narodne-novine.nn.hr/sitemap_1_2023_28.xml contains the URLs of all regulations of the official edition of NN 28/2023 in the basic NN format and the equivalent ELI format. The ELI format is used for the official and international parts.

Structured metadata of legal regulations in the Narodne novine database can be accessed for purposes such as indexing, automated, or semi-automated processing by technical users and automated services. The database exposes structured and exposed metadata in three primary formats: RDFa, RDF/XML, and JSON-LD. Within the HTML record of each legal act, RDFa annotations provide metadata defined using the ELI ontology, further enriched with NN-specific vocabularies. This embedded metadata can be inspected directly in a web browser by opening the HTML page of a given regulation and examining the source code of the HTML content. For automated processing, the same metadata are also accessible in machine-readable formats by appending a suffix to the ELI URL. Additionally, metadata can be retrieved via the Narodne novine API, which supports programmatic access for automated services. To ensure responsible use of system resources, it is recommended that scripts or bots do not exceed three requests per second.

While the legislative portal allows users to download legislative texts, it exhibits significant limitations in terms of accessibility, as it does not provide hyperlinks to related legal acts and lacks a document notification system for newly adopted legislation. There is no unified electronic workflow for the publication process; legislative texts intended for publication continue to be transmitted in paper form.

5.2. Slovenia - the main features of governance of legislative portals and the application of the proposed assessment framework

A key legal instrument in the pursuit of open, transparent, and therefore more accountable public administration in Slovenia is the right of access to public information, guaranteed by Article 39 of the Constitution of the Republic of Slovenia and regulated by the Access to Public

Information Act, which establishes the conditions and procedures under which individuals may obtain information held by public authorities. Transparency is implemented through mechanisms such as the proactive online publication of information by public authorities, public consultation on draft regulations, transparency in public spending, facilitation of public sector information reuse, and access to public information.

Slovenia has systematically developed its open data framework since 2015, with its open data market maturity consistently rated above the European Union average. Slovenia has transposed the PSI Directive on the re-use of public sector information (Directive 2003/98/EC) into its legal system, ensuring the availability of public sector information for reuse. Transposing amendments to the PSI Directive adopted in 2013 and 2019 in the Slovenian open data framework further advanced openness by eliminating reuse fees and mandating web-based, user-friendly access to data as open data.

The Open Data Directive (Directive EU/2019/1024) further strengthened the framework for open data by expanding the scope of data subject to reuse, promoting their availability in machine-readable formats under open licenses, and establishing a detailed framework for high-value datasets. Slovenia transposed the Open Data Directive through an amendment to the Access to Public Information Act and the adoption of the new Regulation on the Provision and Re-use of Public Sector Information. This transposition, completed in 2022, reinforced the national open data regime by broadening the scope of reusable data, requiring their availability in machine-readable formats under open licenses, and formalizing the high-value datasets framework. The first national list of high-value datasets was set out in Annex II to the Regulation on the Provision and Re-use of Public Sector Information.

Slovenia is currently implementing the Digital Strategy 2022-2030³⁹, which includes a dedicated section on the digital data economy and open data. The Ministry of Public Administration is responsible for overseeing the implementation of the open data policy and managing the national open data portal. Its activities include developing the legal framework, issuing guidance for data providers, and conducting public consultations to promote the reuse of public sector data.

Slovenia has established a robust and legally grounded open data framework. European Union open data directives have been systematically transposed into national legislation and

³⁹ The Digital Strategy
<https://www.gov.si/assets/ministrstva/MGTS/Dokumenti/DIPT/Digitalizacija/Strategija-digitalne-transformacije-gospodarstva.pdf> visited 12/12/2025

supported by strategic policy instruments, notably the Digital Strategy 2030 and initiatives in the field of open science. The framework emphasizes high levels of data reuse through mandatory publication obligations, the adoption of standardized metadata formats such as DCAT-AP, and the promotion of interoperability and collaboration. While challenges remain in ensuring consistent implementation at the local level, ongoing efforts to integrate dynamic datasets through APIs further strengthen the system.

5.2.1. Slovenia - Official Gazette of the Republic of Slovenia and the Legal Information System of the Republic of Slovenia (PISRS)

In the legal system of the Republic of Slovenia, legal norms are adopted at both the national and local levels. The primary legal instruments include the Constitution, laws and acts, as well as subordinate implementing regulations, which are classified into two main types: decrees and rules.

The publication of legal acts, including those of state authorities, local government bodies, and other public authorities, is governed by the Official Journal of the Republic of Slovenia Act. According to Article 1 of this legislation, all state regulations and other acts, where mandated by law or regulation, must be published in the Official Gazette of the Republic of Slovenia.

The Official Gazette of the Republic of Slovenia (Uradni list Republike Slovenije) serves as the official publisher of all national legislation, regulations, international treaties, and legal notices in Slovenia. The Official Gazette is managed by the Slovenian Government Office for Legislation. The Official Gazette is published by the public company Javno podjetje Uradni list Republike Slovenije d.o.o. (the Official Gazette of the Republic of Slovenia Ltd.), supervised by the Government Office for Legislation. The Republic of Slovenia is the exclusive proprietor and sole shareholder of this public enterprise. Financing comes from the sales revenues of all documents and the notices published. The price for the published texts is set by the government. The Official Gazette is usually published once a week on a day determined by the head of the Government Office for Legislation. The director of the public company is responsible for the regular and timely publication of the Official Gazette.

The Uradni list Republike Slovenije contains parts with legislation and international treaties, as well as a part with legal notices and other official texts. It provides free online access to legislation, publishes legal books, and manages key government portals, such as the Public Procurement Portal, making it central to Slovenian legal information. All documents are

published online⁴⁰, providing open access to legal texts and official notifications. Since April 2010, the electronic version of the Uradni list Republike Slovenije constitutes the official and legally binding edition. Prior to publication, all acts are reviewed by the Government Office for Legislation.

The Uradni list Republike Slovenije offers a freely accessible online database and provides free and comprehensive access to the archive, serving as a central repository for Slovenian legal data and information, including statutes, regulations, and other public notices containing all documents published since 1991. Users can browse, search by title, number, category, keyword, or publication date, and download documents in PDF and HTML formats. While the PDF version remains legally binding, the HTML version facilitates ease of access and review. A subscription-based service provides additional functionalities, including instant notifications via email or SMS for new issues or specific document categories. The service *UL Info Tok* enables users to receive alerts regarding newly published content. All official texts are published in the Slovenian language. The Uradni list Republike Slovenije is available exclusively in the Slovenian language.

Complementing this, the Legal Information System of the Republic of Slovenia (Pravni informacijski sistem Republike Slovenije⁴¹) serves as Slovenia's official legislative portal. As an electronic database, its primary goal and purpose is to provide the public with transparent, efficient, and free access to laws, regulations, and other general acts in force or applicable within the legal order of the Republic of Slovenia, along with relevant references to European Union legislation, Slovenian case law, and other pertinent legal information. In addition to providing access to the Official Gazette, the system encompasses a broader range of content related to normative activity at both the national and European Union levels. An integral component of the portal is the eDemocracy platform, which supports and facilitates public consultation in the preparation and monitoring of regulations and other general acts. With the exception of the Official Gazette, the content on the legislative portal is informative.

The establishment and functioning of the Legal Information System of the Republic of Slovenia are governed by the Official Gazette of the Republic of Slovenia Act (article 11a) and the Decree on the Legal Information System of the Republic of Slovenia. The Government is determining by the mentioned Decree in greater detail the content of the Legal Information System of the Republic of Slovenia, the manner of its management and operation, and the

⁴⁰ Uradni list Republike Slovenije <http://www.uradni-list.si> visited 12/12/2025

⁴¹ Pravni informacijski sistem Republike Slovenije <https://pisrs.si/> visited 12/12/2025

obligations of state authorities and the public company Uradni list Republike Slovenije, d. o. o in relation thereto. In March 2024, the new Legal Information System of the Republic of Slovenia replaced the existing legislative system and became operational, introducing significant improvements and upgrades to the available functionalities, as well as providing an enhanced user experience.

The Government Office for Legislation (Služba vlade za zakonodajo) manages, operates, and coordinates the Legal Information System of the Republic of Slovenia. By means of an act specifying the manner in which the portal tasks are to be performed, the Government Office for Legislation delegates the management of the Legal Information System to a public company. The legislative portal is administered by the public enterprise Uradni list Republike Slovenije d.o.o. The Head of the Government Office for Legislation appoints an Editorial Board of the Legal Information System, composed of representatives of state authorities providing data to the system, the public company, and experts in the fields of law and information technology. The state budget covers the costs associated with the obligations referred to the Legal Information System.

The Legal Information System, as a legislative portal, plays a central role in the dissemination of legal and regulatory information. Its operation directly supports the implementation of the Open Data Policy and the regulatory framework governing access to public sector information, ensuring that laws, regulations, and other general acts are made publicly accessible and reusable. In accordance with the Slovenian open data framework, the legislative portal ensures that legal data are made available in an open, transparent, and non-discriminatory manner, free of charge and without unjustified restrictions on access or reuse. The methods for presenting and retrieving information within the legal information system are designed in accordance with established open data standards, as well as recognized standards in the fields of online content design and accessibility.

Compared to the previous legal information system, the new Legal Information System represents a conceptually, structurally, and technologically entirely new information system. The Legal Information System is published on websites and is freely accessible. The content made available through the legislative portal is accessed by interconnecting the information systems, registers, collections, and records of public authorities. The content and data published in the Legal Information System are for informational purposes only, with the exception of the Official Gazette. All documents in the official and international sections are accessible in both HTML and PDF formats, and a PDF version of the complete published editions is provided. It is deployed in the national government cloud and interconnected with

numerous external registers, databases, and records. It also contains links to the EUR-Lex website, where information and texts of European Union legal acts are published. The system is enhanced with a wide range of new functionalities that improve the user experience and facilitate easier searching and reading of content, including, inter alia, a text comparison tool, visualization of links between regulations and other legal acts, a dynamic advanced search engine, personalized user settings, and the possibility to submit comments on regulations in force that are open for public consultation. Also, prompt user assistance is available.

Legal data provided by the Legal Information System is subject to an Open License, allowing free, unrestricted reuse, including reproduction, distribution, and adaptation. In addition, the database exposes structured and exposed metadata in three primary formats: RDFa, RDF/XML, and JSON-LD. Within the HTML record of each legal act, RDFa annotations provide metadata defined using the ELI ontology. Moreover, an application programming interface (API) is available, enabling the retrieval and reuse of the most frequently accessed data and legal texts. Use of the API requires an authorization issued by the Government of the Republic of Slovenia Office for Legislation.

5.3. France - the main features of governance of legislative portals and the application of the proposed assessment framework

France has developed a robust and comprehensive open data framework oriented toward transparency, innovation, and public value creation, supported by a centralized national portal and legislation that designates public data as "*open by default*." Public sector information is systematically released under permissive licenses that allow free access, reuse, modification, and redistribution. This approach seeks to enhance governmental accountability, stimulate data-driven economic activity, improve the efficiency and quality of public services, encourage citizen participation, and advance open science.

The foundations of this framework can be traced to early access-to-information legislation, notably the 1978 law on access to administrative documents, which established the groundwork for public access rights to information and later progressively incorporated principles of open reuse and licensing. The PSI Directive (Directive 2013/37/EU) was transposed into French law in 2005 to facilitate (re)use of existing documents and data held by public organizations. In 2011, Decree 2011-577 on the re-use of public sector information established the principle that such data and documents should be freely reusable.

A significant development in France's open data trajectory also occurred in 2011 with the establishment of the Etalab mission through Decree No. 2011-194. The mission was tasked

with creating a centralized interministerial portal to consolidate and freely disseminate datasets produced by government entities. This initiative was complemented by Decree No. 2011-577, which extended principles of data reuse to information held by the state and its public institutions.

Momentum increased substantially with the adoption of the Digital Republic Act in 2016, which established the principle of openness by default for non-sensitive public sector data. The law serves a dual purpose: giving France a competitive edge in the digital domain and promoting an open data and knowledge policy. Under this framework, public administrations at both national and subnational levels are required to make data freely available for reuse, subject only to narrowly defined exceptions such as national security, personal data protection, or third-party intellectual property rights. The law also emphasizes machine-readable formats and, where feasible, dynamic publication, reinforcing both transparency and innovation.

Subsequent developments aligned France's open data framework with European Union open data requirements, notably through the transposition of the Open Data Directive (Directive EU/2019/1024) in 2021, which reinforced proactive publication, marginal-cost pricing for reuse, and broader access to dynamically generated data. National legislation aligns with broader European Union directives on public sector information reuse, extending obligations to public undertakings and cultural institutions and introducing provisions for high-value datasets, positioning France as a leader in data openness.

5.3.1. France - The Official Journal of the French Republic and Légifrance

In France, the law primarily consists of written rules, known as sources of law. These include regulations enacted by the State or agreements between States at the national level, as well as case law from national and international courts. They also encompass rules established at the local level, such as municipal by-laws, or by professional and trade organizations. Additionally, they cover rules created by citizens themselves, including collective agreements and contracts, and finally, customary practices.

For laws and regulations to be legally binding, they must be made known to the public and must be published. The Order No. 2004-164 modified the rules governing that legislative and regulatory texts must be published to take effect. Laws, ordinances, decrees, and other administrative acts (when provided for by law or decree) are published in the Official Journal of the French Republic, which serves as the authoritative source of French law. The legal basis

for publishing is also covered by the current Article 1 of the Civil Code: unless otherwise specified, a legal text comes into force the day after its publication in the Official Journal.

The publication of the aforementioned acts is carried out on the same day, under conditions that ensure their authenticity, in both paper and electronic formats. The Official Journal of the French Republic is permanently accessible to the public in electronic form, free of charge.

The Official Journal of the French Republic serves as the government gazette, publishing the principal legal and official information issued by the national government, the French Parliament, and the Constitutional Council. The Directorate of Official Gazettes, a service under the Prime Minister's office, is responsible for publishing the Official Journal.

The Official Journal of the French Republic contains laws, decrees, orders, regulatory acts, administrative and budgetary measures, acts of independent authorities, circulars, collective agreements, parliamentary information, opinions, and communications, and various official announcements, including judicial and legal announcements, concessions, and name-change requests. In accordance with Law No. 2015-1713 on the dematerialization of the Official Journal of the French Republic, since January 2016, the Official Journal has been published exclusively in electronic form. Only the digital version available on the official legislative portal - Légifrance is legally binding.

Légifrance is the official French government website for the publication and dissemination of legislation, regulations, and legal information. Established by the Decree in 2002, this legislative portal provides free public access to consolidated laws, regulatory texts, and official publications, including the Official Journal of the French Republic. The portal is managed by the French Directorate of Legal and Administrative Information (DILA) under the authority of the Prime Minister's office.

The Official Journal of the French Republic, accessible via Légifrance and, consequently, Légifrance itself as a public service for the dissemination of French law, are funded through the national government budget under the responsibility of a dedicated public authority, the Directorate of Legal and Administrative Information (DILA). As the publication of laws and governmental acts is a legal obligation, the financing of the Official Journal and Légifrance constitutes a core public expenditure. Accordingly, the Official Journal and Légifrance operate as public services financed by taxpayers' money rather than private sources, ensuring both universal accessibility and the legal validity of published texts.

Légifrance provides access to the full text of the Official Journal from 1990 onward, consolidated statutes and decrees dating back to 1978, and all official legal codes, some of which are available in English and Spanish. The portal includes an extensive selection of case law from both the judicial courts, covering civil and criminal matters, and the administrative courts, with a particularly comprehensive collection of constitutional law cases, making it one of the most comprehensive public repositories of constitutional jurisprudence in Europe. Users can also freely access European and international law, including links to treaties signed and ratified by France, as well as links to other official legal resources. The portal also offers user guides and tutorials in French, along with an English-language overview of the French legal system. Since July 2014, all public legal databases have been made available in XML format under an open data license, allowing for reuse of the legal data. Specifically, data from Légifrance is freely reusable in accordance with the Decree of 24 June 2014, which governs the free reuse of legal databases maintained by the Directorate of Legal and Administrative Information. The reuse of data is subject to compliance with the terms of a free license.

Légifrance, as the official legislative portal of France, occupies a central role in the dissemination of legal and regulatory information and actively supports the implementation of the Open Data Policy. It ensures that laws, regulations, and other general legal acts are publicly accessible and reusable. In accordance with the open data requirements, Légifrance guarantees that legal information is provided in an open, transparent, and non-discriminatory manner, free of charge and without restrictions on access or reuse.

The modernized Légifrance portal was launched in September 2020, offering users access to an updated platform with free access to its content. The legal basis for the "new" Légifrance is Decree No. 2020-1119, which expands and completes the list of legal data made freely available to the public. Legal texts are available in PDF format dating back to 1869 and in HTML format from 1990 onward. Légifrance offers various functionalities, including document downloads, hyperlinks to related legal acts, and a document notification service. The Official Journal is accessible in HTML, PDF, and XML formats derived from open data, and its authenticity on the Légifrance website is fully guaranteed. The Directorate of Legal and Administrative Information (DILA) is responsible for maintaining the Official Journal online with no time limitation. Significant updates have been made to the legislative portal to provide easier navigation, enhance search functionality, and better integration with the Official Journal. Users can search for documents by type of law using simple, expert, or thematic search tools. While French is the only language that confers legal authority to the texts, many consolidated versions are also available in English for informational purposes. The portal also provides a satisfaction questionnaire regarding the use of the Légifrance website.

The use of legal data provided by Légifrance is subject to the Open License 2.0, a free and permissive license compatible with Creative Commons Attribution (CC-BY). This license allows anyone to copy, share, modify, and redistribute the licensed material, in whole or in part, for any purpose, including commercial use, provided that appropriate credit is given to the original source and any changes are clearly indicated. No additional legal or technical restrictions may be applied beyond those specified by the license. Moreover, the database publishes structured metadata in three principal formats: RDFa, RDF/XML, and JSON-LD. In the HTML representation of each legal act, RDFa annotations encode metadata in accordance with the ELI ontology.

A notable development is the introduction of an API, made available under a license agreement, which facilitates the dissemination and reuse of legal data. To facilitate the reuse of legal data, the DILA provides a free API through the PISTE portal, accessible after registration. A stable version of the API has been available since April 2023. The stable API provides access to the same legal data published on the Légifrance website. Use of this data is subject to the general terms and conditions of use of the PISTE portal, the general terms and conditions of use of the Légifrance API, and the usage quotas defined on the PISTE portal.

6. Discussion

This paper employs a comparative analysis to examine open data policies and frameworks, as well as the governance of legislative portals in Croatia, Slovenia, and France, with particular emphasis on institutional organization, data quality, public accessibility, data availability, and reuse. Although Croatia has established a solid legal foundation for access to open and legal data and their re(use), the comparative assessment indicates that Slovenia and France ensure greater institutional coherence, maturity, and continuity in open data governance and have achieved higher levels of systemic integration, functional sophistication, and strategic orientation in the development and governance of their legislative data ecosystems.

The assessment of indicator 1.1, the policy framework, demonstrates that Croatia has established a comprehensive legal framework for open data governance, but the open data framework is primarily characterized by formal compliance with European Union open data requirements, supported through the Right of Access to Information Act. European Union open data directives have been transposed into national law as required; however, their operationalization through institutional arrangements remains limited. Strategic direction is provided through the National Open Data Policies adopted in 2018 and updated in 2025, which align national objectives with evolving European Union legal and policy standards, particularly regarding high-value datasets. From a formal legal perspective, Croatia demonstrates a high level of compliance with European Union open data requirements. The scope of application is broad, covering all public authorities at all levels of governance, and statutory obligations concerning machine-readable formats, standardized publication, and the use of APIs are clearly articulated.

Despite this strong legal foundation, the assessment of indicator 1.2, the governance of open data, shows that Croatia's open data governance framework exhibits structural weaknesses at the level of institutional arrangements. Governance responsibilities are dispersed across institutions, resulting in fragmented coordination and variable interpretation of open data obligations. While formal mandates exist, governance responsibilities are not always clearly defined, which can undermine institutional coordination and affect the consistency of implementation of open data standards.

In comparison, Slovenia presents a more coherent and mature model of open data governance. The assessment of indicator 1.1, the policy framework, demonstrates that Slovenia has a robust and legally grounded open data framework. Since 2015, the country has systematically strengthened its open data ecosystem, consistently achieving open data

maturity levels above the European Union average. European Union open data directives have been systematically transposed into national law, expanding the availability of reusable public sector data, eliminating reuse fees, promoting machine-readable formats and open licenses, and establishing a framework for high-value datasets. These efforts are supported by strategic policy instruments, particularly the Digital Strategy 2030, which further advances transparency, interoperability, and data reuse. Governance responsibilities are clearly defined, enabling strong institutional coordination, well-established mandates, and continuity in policy implementation. The well-developed open data framework supports the consistent and effective application of open data principles.

France demonstrates a clear advantage over Croatia in the adoption and implementation of the open data standards. France represents an even more advanced model than Slovenia, where open data governance is embedded in a broader normative framework through the "*open by default*" principle, institutionalized by the Digital Republic Act, which establishes proactive publication of public sector data as the norm, subject only to clearly defined exceptions. The assessment of indicator 1.1, the policy framework, demonstrates that openness is treated as an integral component of democratic governance and economic innovation rather than as a purely administrative obligation, reflecting a substantive and value-driven commitment to open data standards. France has established a robust open data framework focused on transparency, innovation, and public value creation, and these developments position France as a leading European Union country in open data governance and implementation.

The evaluation of indicator 1.2, the governance of open data, demonstrates that Slovenia's centralized governance structure facilitates effective operationalization. At the same time, France's value-driven approach promotes proactive publication, systematic reuse, and innovation-oriented data management. These models demonstrate how strong institutional coordination and a clear normative commitment to openness can enhance the implementation and practical impact of open data policies.

By assessing indicator 1.3, the open data implementation, it is determined that although openness is legally mandated in Croatia, implementation remains largely procedural and compliance-oriented rather than strategically embedded in public sector information management. Public authorities tend to focus on fulfilling formal publication requirements, with limited integration of open data principles into broader governance and operational practices. As a result, data quality and updating practices are uneven, high-value datasets are not consistently prioritized, and coordination across institutions remains weak.

While the current Croatian framework has succeeded in establishing baseline transparency and legal certainty, these coordination deficits and a lack of strategic integration significantly reduce the overall effectiveness and long-term sustainability of open data initiatives. Despite a sound legal foundation, open data governance and open data implementation in Croatia remain institutionally underdeveloped, constraining its capacity to generate sustained public value.

To address these shortcomings, policy reform should move beyond a compliance-driven approach and focus on strengthening the strategic and operational dimensions of open data governance. Priority actions should focus on embedding the "*open by default*" principle into public sector information management practices, strengthening operational capacity through targeted training, adequate resources, and clear quality standards, and prioritizing the release of high-value datasets. Implementing these measures would support a transition toward a coherent, value-oriented open data governance framework, aligning Croatia more closely with best open data practices observed in France and Slovenia.

Moreover, gaps in open data governance in Croatia become particularly visible when examining the treatment of legislative data, where formal compliance with open data governance and requirements has not translated into meaningful openness in practice.

In Croatia, the legislative publication process remains insufficiently aligned with core open data principles. The Official Gazette - Narodne novine functions primarily as a publication mechanism rather than as an integrated and modern legislative portal. The legislative portal run by Narodne novine provides free access to users but offers limited coverage of legal data, lacks a comprehensive archive, and does not support cross-database linking. In addition, the evaluation of specific indicators related to the portal (functionalities and features, usage, and sustainability) demonstrates that it offers minimal contextualization, exhibits weak interoperability, and includes only basic user-oriented functionalities. Narodne novine does not provide access to European Union law or relevant case law, version comparison tools, or some user support mechanisms. Furthermore, the portal does not incorporate public consultations on legislation, lacks advanced thematic or expert search functionality, fails to provide multilingual data, and does not offer notification services for legislative updates.

These limitations reinforce its role as a formal dissemination platform rather than an interactive legal information system. Consequently, although Narodne novine is formally compliant and uses standardized metadata, the European Legislation Identifier (ELI) ontology, and APIs to enable interoperability and reuse, the integration of machine-readable legal data into everyday

legislative workflows remains limited. By assessing specific indicators focusing on open data quality and data availability, Croatia has not yet achieved a higher level of technical open data maturity, nor does it exhibit a strong capacity for the effective reuse of legal data.

By contrast, Slovenia demonstrates how open data governance and standards can be operationalized within the legislative domain in a more integrated and user-oriented manner. The examination of specific indicators related to the portal reveals that the Legal Information System of the Republic of Slovenia substantially outperforms Croatia's Narodne novine in terms of availability, functionality, and systemic integration. The Legal Information System operates as a comprehensive legal information system rather than a mere publication repository. This legislative portal offers its users free of charge broader coverage of national and European Union laws, offers tools for comparing different versions of legislation, advanced and dynamic search capabilities, personalized user settings for registered users, and direct links to relevant European Union legislation and national case law. In addition, it integrates an e-Democracy platform that enables public consultations within the same legislative environment, embedding public participation directly into the legislative system. Supported by standardized metadata, the ELI ontology, and APIs that enable interoperability and reuse, the Legal Information System operates as a modern user-centric and interactive legislative portal that supports legal transparency, analysis, engagement, and practical reuse of legal data. By assessing specific indicators associated with open data quality and data availability, it becomes evident that Slovenia demonstrates a higher level of technical maturity and more effective real-world reuse of legislative open data. As a result, it achieves stronger performance in the practical implementation of open data principles.

Compared with Croatia and Slovenia, France represents a highly advanced and strategic model of legal data openness. The principle of "*open by default*," embedded in national legislation, mandates and ensures proactive publication of public sector information and ensures that legal data is transparent, accessible, and reusable. Central to this framework is Légifrance, a modern, comprehensive, and integrated legislative portal.

An assessment of specific portal-related indicators indicates that Légifrance offers significantly broader and more mature content coverage than its Croatian and Slovenian counterparts. Since 2020, the scope of legal data freely accessible to the public has been further expanded and systematized, encompassing national legislation, extensive judicial and administrative case law, and links to multiple national legal databases. The portal also provides direct access to European and international legal sources, including treaties ratified by France, as well as connections to other official legal resources. Historical legal materials are made available

through structured archives, enabling longitudinal legal research and analysis. The portal also integrates consolidated legal texts with complete amendment histories, advanced thematic and expert search tools, and notification services that allow users to track legislative and jurisprudential developments efficiently. European Union law and international legal instruments are fully integrated, and user guides and tutorials are provided in French, alongside an English-language overview of the French legal system. This combination of extensive coverage and structured interoperability positions Légifrance as a highly advanced model of legislative transparency and practical legal data reuse.

Moreover, a defining feature of Légifrance is the full digitalization of the Official Journal, available in HTML, PDF, and XML formats, ensuring the authenticity, permanence, and legal reliability of official publications. Since 2014, all public legal databases hosted on Légifrance have been released in XML format under the Open License 2.0, permitting free reuse, modification, and redistribution - including for commercial purposes - subject to attribution. Legal data are enriched with structured metadata and annotated according to the European Legislation Identifier (ELI) ontology, enabling high levels of interoperability.

Further reinforcing this model, France provides stable and well-documented APIs through the PISTE platform, enabling researchers and developers to access legal data programmatically under clearly defined terms of use. The analysis of the key indicators pertaining to data quality and availability highlights that, when combined with the comprehensive dematerialization of official legal publications, a permissive open-licensing regime, the systematic use of structured metadata, and a mature technical infrastructure, France operates at a significantly more advanced stage of legal data accessibility and reuse than its Croatian and Slovenian counterparts.

An overview of the results obtained after applying the proposed framework to the selected countries and their respective legislative portals is presented in Table 9. A detailed description of the applied framework is provided in the Annex to this paper.

Table 9: *Comparative Overview of the results obtained after applying the proposed framework*

Dimension	Indicator	Croatia	Ave	Slovenia	Ave	France	Ave	Average
1. Policy and Governance	1.1. Policy framework	Advanced	3,33	Very advanced	4,33	Very advanced	5	4,66
	1.2. Governance of open data	Moderate		Advanced		Very advanced		4
	1.3. Open data implementation	Moderate		Advanced		Very advanced		4
	Total	10	3,33	13	4,33	15	5	4,2
	2.1. Metadata timeliness	Moderate		Advanced		Very advanced		4

2. Data Quality	and completeness							
	2.2. Monitoring and measures	Basic	2,66	Advanced	4	Very advanced	5	3,66
	2.3. Metadata quality and compliance with the required standard	Moderate		Advanced		Very advanced		4
	Total	8	2,66	12	4	15	5	3,88
3. Data Availability	3.1. Availability of data (Technical Openness)	Moderate	3,33	Advanced	4	Very advanced	5	4
	3.2. Availability of data (Pricing model)	Advanced		Advanced		Very advanced		4,33
	3.3. Data completeness and data search function	Moderate		Advanced		Very advanced		4
	Total	10	3,33	12	4	15	5	4,11
4. Portal	4.1. Portal functionalities and features	Moderate	1,66	Advanced	3	Advanced	4	3,66
	4.2. Portal usage	Limited		Moderate		Advanced		2,66
	4.3. Portal Sustainability	Limited		Basic		Advanced		2,33
	Total	5	1,66	9	3	12	4	2,88
	TOTAL/AVERAGE	33	2,8%	46	3,8%	57	4,75%	3,78 %

Source: Author based on the results obtained after applying the proposed framework provided in the Annex to this paper.

The ratings assigned during the assessment of legislative portals reflect different levels of development and capability, progressing from lower to higher degrees of maturity. The use of the rating scale enables a structured and comparable evaluation of legislative portals across multiple dimensions, supporting the identification of strengths, weaknesses, and areas for improvement.

The levels are defined as follows:

- **Limited (Score 1):** Indicates an early stage of development with significant implementation gaps. Substantial improvements are required to meet basic good practice standards.
- **Basic (Score 2):** Core elements are present, but their scope and effectiveness remain limited. Initial progress has been made, though considerable development is still needed.
- **Moderate (Score 3):** Represents a functioning framework with several established practices in place. While demonstrating maturity beyond the basic level, further improvements are required to reach best practice.
- **Advanced (Score 4):** Denotes a well-developed and consistently implemented approach aligned with recognized good practices. Only minor refinements are needed to achieve leading performance.
- **Very Advanced (Score 5):** Reflects a highly mature, comprehensive, and exemplary implementation consistent with international best practices and characterized by continuous improvement.

A detailed breakdown of the ratings applied across the different dimensions is provided in the Annex to this paper.

The assessment of legislative portals highlights notable differences in the governance of open data, data quality, open data infrastructure, and ecosystem development, revealing specific gaps that require practical and strategic improvements.

Table 10: Overview of achieved scores across countries based on the applied framework

Country	Total points	Ratings
France	57 (4,75%)	Very advanced
Slovenia	46 (3,8%)	Advanced
Croatia	33 (2,8%)	Moderate
Total average for all	3,78%	Advanced

Source: Author based on the results obtained after applying the proposed framework provided in the Annex to this paper.

The results are based on the summed scores across all evaluated dimensions. The total average score for all three countries falls within the Advanced category. However, France scores the highest overall, followed by Slovenia, while Croatia records the lowest total score. France demonstrates the strongest performance across nearly all dimensions, including open data policy, governance, data quality, availability, and portal functionality. Slovenia follows closely, showing strong governance structures, advanced technical openness, and broad data coverage. In contrast, Croatia stays behind, particularly in data quality and opportunities for data reuse, advanced portal features, and overall implementation maturity. Croatia's lower scores reflect structural and technical limitations that hinder the development of an advanced, user-friendly, and reuse-oriented open data ecosystem.

France stands out as the most mature and developed model among the compared countries. Its open data ecosystem is not only technically advanced but also strategically coordinated, ensuring consistent data quality, broad accessibility, and strong support for reuse. The combination of robust governance structures, sophisticated portal functionalities, comprehensive data coverage, high-quality and widely available legal datasets, and extensive use of stable APIs positions France as a leading example and benchmark case of how a modern legislative open data system should operate.

Slovenia demonstrates solid operational maturity with room for a stronger strategic orientation and occupies an intermediate position, with an open data system that is operationally mature. Open data governance structures, data quality, and portal functionalities are advanced. Although reuse mechanisms and APIs have been developed, ecosystem support and long-term strategic alignment remain limited compared with France.

Although Croatia exhibits an advanced policy framework, its open data implementation remains largely compliance-driven. The effectiveness of open data governance is moderate, while data quality, availability, formats, and reuse mechanisms remain at a basic level. This reveals a gap between policy intent and practical outcomes, particularly with regard to user engagement, availability of data, and data reuse. Although Croatia's open data approach is strongly policy-driven, implementation and value creation remain limited, as clearly illustrated by the Narodne novine as a legislative portal.

In conclusion, while Croatia has established the necessary legal infrastructure for transparency and open data, Slovenia and France demonstrate superior implementation through integrated open data governance, data quality, and data availability, and consequently data reuse. The comparative findings suggest that future improvements in Croatia should focus on enhanced institutional coordination in the context of open data, full digitalization of legislative workflows, improved data quality and availability, and the development of legislative portals as comprehensive legal information systems rather than mere publication platforms.

7. Conclusions and recommendations

The paper examined the governance and availability of open legal data through a comparative analysis of legislative portals in Croatia, Slovenia, and France. By developing and applying a tailored assessment framework for legislative portals that publish legal data, the research tried to address an overlooked gap in existing studies and literature concerning the systematic evaluation of legislative portals as a distinct category of open data portals. The findings demonstrate that, while all three countries formally align with established open data standards and requirements, substantial differences exist in open data governance, data quality, data availability, technical implementation, and consequently, the practical usability of legal data.

The analysis reveals a progression from compliance-oriented openness toward value-driven open data governance. Croatia has established a comprehensive open data policy framework that ensures baseline transparency and formal access to public information. However, weak open data governance within organizations, limited technical maturity, and a narrow conception of legislative portals primarily as publication platforms constrain the effective reuse of legal data and information.

In contrast, Slovenia outperforms Croatia in several key areas, including the practical implementation of open data policies, institutional coordination, legal data coverage, data quality, and the development of user-oriented legislative portals. Slovenia illustrates a more operationally mature open data model, characterized by coherent governance structures, higher data availability and quality, and advanced portal functionalities that actively support reuse.

France represents a benchmark case in the comparative analysis. It surpasses Croatia in terms of strategic openness and the adoption of an *"open by default"* principle, the completeness and depth of its legal information systems, and the full digitalization of official legislative and publication workflows. Advanced interoperability, permissive licensing, and a strong commitment to data quality and accessibility, combined with explicit support for legal data reuse, enable sustained public value creation and position France as the most mature open data system among the three cases.

Overall, the comparison reveals a clear progression from formal compliance to effective implementation. Croatia remains at a foundational stage, Slovenia reflects a consolidated and practice-oriented model, and France illustrates a mature, future-oriented system of legislative transparency and open data governance. These findings suggest that, beyond legal alignment,

institutional integration, and long-term strategic commitment to open data policies are decisive factors in achieving a meaningful open data environment. While Croatia has established the essential legal foundations for open data, Slovenia and France exhibit more mature, integrated, and focused open data governance models, demonstrating a higher level of operational effectiveness and sustainability. The findings confirm that an open data framework alone is insufficient to achieve meaningful openness. Effective open data reuse depends on focused governance arrangements and a strategic commitment, high-quality and machine-readable data, and advanced portal functionalities. Legislative portals emerge not merely as technical tools but as central components of democratic governance, legal certainty, and data-driven innovation.

Based on these conclusions, several recommendations can be derived. First, open data policies should move beyond formal compliance and explicitly promote reuse as a core objective, particularly in the legal domain. This requires embedding open data principles into everyday legislative and administrative workflows rather than treating the publication of legal data as an isolated obligation. Second, stronger institutional coordination mechanisms within legislative portals are needed, supported by clearly defined responsibilities, sufficient financial and human resources, continuous education in the field of open data, and sustained capacity-building initiatives. Third, legal data should be made consistently available in machine-readable formats, under the Open License, enriched with complete and standardized metadata, and supported by stable APIs to facilitate systematic reuse by legal professionals, researchers, and developers.

In addition, greater attention should be paid to data quality, availability, and technical openness, as deficiencies in these areas directly limit the analytical and practical value of legal data and their reuse. Given the specific and complex nature of legal content, legislative portals should also prioritize user-oriented features, including advanced search capabilities, intuitive navigation, version-comparison tools, and clear explanatory guidance. Finally, reliance by legal professionals and others on privately owned legislative platforms should be limited, as such arrangements may restrict the breadth of data, transparency, and long-term accessibility, thereby undermining public oversight and scientific research. Legislative portals governed by public authorities should be the standard, and further efforts are needed to enhance the availability of open data, particularly in terms of technical openness and data completeness.

Taken together, these recommendations underline the need for a strategic and sustainability-focused approach to legislative portals in Croatia. Open data policies that actively foster the reuse of legal data should be promoted at all levels and established as a core principle for

legislative portals. Strengthening governance, technical infrastructure, and institutional commitment, while embedding user-oriented and reuse-focused strategies, is essential for transforming legislative portals into comprehensive legal information systems capable of delivering lasting public value.

8. Bibliography and Sources

A. Books and articles

1. Alexopoulos, C., Diamantopoulou, V., & Charalabidis, Y. (2017). Tracking the Evolution of OGD Portals: A Maturity Model. 16th International Conference on Electronic Government (EGOV), Sep 2017, St. Petersburg, Russia. 287-300, https://doi.org/10.1007/978-3-319-64677-0_24
2. Alexopoulos, C., Loukis, E., & Virkar, S. (2024). Architecture and Evaluation of an Advanced Legal Information Platform - Enhancing Productivity of Modern Legal Work. Journal of the Knowledge Economy, Vol 15, 8654–8681, <https://doi.org/10.1007/s13132-023-01415-5>
3. Alexopoulos, C., Virkar, S., Loutsaris, M. A., Novak, A. S., & Loukis, E. (2020). Analysing Legal Information Requirements for Public Policy Making. In Electronic Participation: 12th IFIP WG 8.5 International Conference, ePart 2020 Linköping, Sweden (online), August 31 - September 2, 2020, 95-108, Springer, https://doi.org/10.1007/978-3-030-58141-1_8
4. Alexopoulos, C., Virkar, S., Loutsaris, M., & Musa, A. (2021). The Complementarity of Legal Data Platforms: Identification of Functionalities and Open Issues Published in: Digital Policy, Regulation and Governance, ISSN 2398-5038, Publisher: Emerald Publishing – UK <https://doi.org/10.5281/zenodo.5138099>
5. Ali, M., Papageorgiou, G., Aziz, A., Loukis, E., Charalabidis, Y., & López, F. (2024). Towards the Development of Interoperable Open Data Ecosystems: Harnessing the Technical, Semantic, Legal, and Organizational (TSLO) Interoperability Framework. In the 25th Annual International Conference on Digital Government Research, June 11-14, 2024, Taipei, Taiwan. ACM, 909-919, <https://doi.org/10.1145/3657054.3657160>
6. Andraško, J., & Mesarčík, M. (2018). "Quo Vadis Open data?" *Masaryk University Journal of Law and Technology* 12, no. 2, 179–220. <http://dx.doi.org/10.5817/mujlt2018-2-4>
7. Braunschweig, K., Eberius, J., Thiele, M., & Lehner, W. (2012). The State of Open Data Limits of Current Open Data Platforms, 1, 72-72.
8. Broomfield, H. (2023). Where is open data in the Open Data Directive? *Information Polity*, 28(2), 175-188, <https://doi.org/10.3233/IP-220053>
9. Calzati, S., & van Loenen, B. (2025). Beyond federated data: a data commoning proposition for the EU's citizen-centric digital strategy. *AI & Soc* Vol 40, 945–957, <https://doi.org/10.1007/s00146-023-01743-9>
10. Charalabidis, Y., Alexopoulos, C., & Loukis, E. (2016). A taxonomy of open government data research areas and topics, *Journal of Organizational Computing and Electronic Commerce*, 26:1-2, 41-63, <https://doi.org/10.1080/10919392.2015.1124720>

11. Charalabidis, Y., Zuiderwijk, A., Alexopoulos, C., Janssen, M., Lampoltshammer, T., & Ferro, E. (2018). The World of Open Data - Concepts, Methods, Tools and Experiences. *Information and Communication Technology*, 95-113, https://doi.org/10.1007/978-3-319-90850-2_6
12. Cranefield, J., Robertson, O., & Oliver, G. (2014). Value in the mash: exploring the benefits, barriers, and enablers of open data apps. 22nd European Conference on Information Systems (ECIS, 2014). Tel Aviv, Israel: Association for Information Systems.
13. Dalla Corte, L. (2020). Safeguarding data protection in an open data world: On the idea of balancing open data and data protection in the development of the smart city environment.
14. Filtz, E., Kirrane, S., & Polleres, A. (2021). The linked legal data landscape: linking legal data across different countries. *Artif Intell Law* 29, 485–539. <https://doi.org/10.1007/s10506-021-09282-8>
15. Giannopoulou, A. (2018). Understanding Open Data Regulation: An Analysis of the Licensing Landscape. In: van Loenen B., Vancauwenberghe G., Cromptvoets J. (eds) *Open Data Exposed.*, T.M.C. Asser Press, vol 30, 101–125. https://doi.org/10.1007/978-94-6265-261-3_6
16. Hysenllari, E. (2020). Open Data Portals: A Framework for Assessing User Experience
17. Janssen, M., Charalabidis, Y., & Zuiderwijk, A. (2012). Benefits, Adoption Barriers, and Myths of Open Data and Open Government. *Information Systems Management*, vol. 29, 258-268. <https://doi.org/10.1080/10580530.2012.716740>
18. Jetzek, T., Avital, M., & Bjørn-Andersen, N. (2012). The Value of Open Government Data: A Strategic Analysis Framework.
19. Kapoor, K., Weerakkody, V., & Sivarajah, U. (2015). Open Data Platforms and Their Usability: Proposing a Framework for Evaluating Citizen Intentions. In: Janssen, M., et al. *Open and Big Data Management and Innovation. I3E 2015. Lecture Notes in Computer Science*, vol 9373, 261–271, https://doi.org/10.1007/978-3-319-25013-7_21
20. Katulić, T. (2018). Creative Commons ugovori: pravni temelj otvorene kulture. U: Hebrang Grgić, I. (ur.) *Otvorenost u znanosti i visokom obrazovanju. Školska knjiga*, Zagreb, 220-233.
21. Katulić, T., Lončar, D., & Musa, A. (2022). Privacy and data protection challenges to open data. *International Conference on Open Data "Open Data Challenges in Times of Crisis and Growth"*, Zagreb
22. Katulić, T., Musa, A. & Lončar, D (2023). Understanding some of the open data challenges to data protection in the developing European legal framework. 34th Central European Conference on Information and Intelligent Systems. *Proceedings*, Dubrovnik
23. Kević, K., Kuveždić Divjak, A., & Welle Donker, F. (2023). Benchmarking Geospatial High-Value Data Openness Using GODI Plus Methodology: A Regional Level Case

- Study. ISPRS International Journal of Geo-Information, 12(6), 222, <https://doi.org/10.3390/ijgi12060222>
24. Kitsios, F.C., Papachristos, N., & Kamariotou, M. (2017). Business Models for Open Data Ecosystem: Challenges and Motivations for Entrepreneurship and Innovation. *2017 IEEE 19th Conference on Business Informatics, Vol 1*, 398-407 <https://doi.org/10.1109/CBI.2017.51>
 25. Kop, M. (2020). The Right to Process Data for Machine Learning Purposes in the EU. *Harvard Journal of Law & Technology*. Volume 34.
 26. Krasikov, P., & Legner, C. (2023). A Method to Screen, Assess, and Prepare Open Data for Use. *J. Data and Information Quality*, Vol 15 (4), Article 43, 1-25. <https://doi.org/10.1145/3603708>
 27. Kučera, J., Chlapek, D., Klímek, J., & Necaský, M. (2015). Methodologies and Best Practices for Open Data Publication. *CEUR Workshop Proceedings*. 1343. 52-64.
 28. Kutnjak, A., Hrustek, L., Šlibar, B., Pihir, I., Tomičić Furjan, M., Žajdela Hrustek, N., Vrček, N., Mekovec, R. (2021). Insight of Croatian Open Data Portals Functionalities According to TODO Interdisciplinary Assessment Framework v2.0. *32nd Central European Conference on Information and Intelligent Systems: Proceedings, Varaždin*, 351-357. <https://doi.org/10.5281/zenodo.8112406>
 29. Lankford, W. (2002). "Benchmarking: Understanding the Basics," *The Coastal Business Journal*: Vol. 1: No. 1, Article 8.
 30. Loukis, E, Saxena, S., Rizun, N., Maratsi, M.I., Ali, M., & Alexopoulos, C. (2023). ChatGPT application vis-a-vis Open Government Data (OGD): Capabilities, Public Values, Issues and a Research Agenda. In: Lindgren, I., et al. *Electronic Government. EGOV 2023. Lecture Notes in Computer Science*, vol 14130, https://doi.org/10.1007/978-3-031-41138-0_7
 31. Máchová, R., & Lnénicka, M. (2017). Evaluating the Quality of Open Data Portals on the National Level. *Journal of theoretical and applied electronic commerce research*. 12(1). 21-41. <https://doi.org/10.4067/S0718-18762017000100003>
 32. Marković, M., Gostojic, S., Sladic, G., Stojkov, M., & Milosavljevic, B. (2016). Survey of Open Data in Judicial Systems, *Conference: The 6th International Conference on Information Society and Technology, ICIST 2016*
 33. Matt, C., Eichel, F., Bieri, M., & Pfäffli, D. (2023). Towards a multicentric quality framework for legal information portals: An application to the DACH region, *Government Information Quarterly*, Vol 40 (4), <https://doi.org/10.1016/j.giq.2023.101840>
 34. Miletić, A., Kuveždić Divjak, A. & Welle Donker, F. (2023). Assessment of the Croatian Open Data Portal Using User-Oriented Metrics. *ISPRS International Journal of Geo-Information*. 12(5), 185. <https://doi.org/10.3390/ijgi12050185>

35. Musa, A. (2019). Open data and reuse of public sector information: What does the Directive on Open Data bring to citizens and public sector? // Informator: instruktivno-informativni list za ekonomska i pravna pitanja, Prilog uz broj (2019), 6604 od 9.12.2019.; 2-12
36. Musa, A. (2017). Transparentno sudstvo u funkciji efikasne primjene prava i učinkovite uprave: objava upravnosudske prakse. Hrvatska i komparativna javna uprava, Poseban prilog uz br. 4/2017.
37. Musa, A. (2015). Građani, informacije i uprava: europske perspektive ponovne uporabe informacija. Znanstveno-istraživački projekt Pravnog fakulteta Sveučilišta u Zagrebu "Novi hrvatski pravni sustav".
38. Musa, A., Bevandić, D., Herak, D., Jadrijević, L., Kovačić, M., Luša, Z. & Vrčec, N. (2018). Handbook on re-use of information for public authorities: open data for all. Povjerenik za informiranje
39. Musa, A., Đurman, P., Katulić, T., Rogić Lugarić, T., Jurić, M., & Habazin, M. (2020). Disciplinary research on open data - Law, Public Administration, Policy & Governance: National Open Data Portal Analysis.
40. Nikiforova, A. (2020). Timeliness of Open Data in Open Government Data Portals Through Pandemic-related Data: a long data way from the publisher to the user. Fourth International Conference on Multimedia Computing, Networking and Applications (MCNA), Valencia, Spain, 131-138, <https://doi.org/10.1109/MCNA50957.2020.9264298>
41. Nikiforova, A. & McBride, K. (2021). Open government data portal usability: A user-centered usability analysis of 41 open government data portals, Telematics and Informatics, Vol 58, <https://doi.org/10.1016/j.tele.2020.101539>
42. Nishikawa-Pacher, A. & Hamann, H. (2023). Is Every Law for Everyone? Assessing Access to National Legislation through Official Legal Databases around the World. Oxford Journal of Legal Studies, Vol. 43, No. 2, 298-32,1 <https://doi.org/10.1093/ojls/ggac032>
43. Nugroho, R.P., Zuiderwijk, A., Janssen, M., & de Jong, M. (2015). "A comparison of national open data policies: lessons learned". Transforming Government: People, Process and Policy, Vol. 9 No. 3, 286–308, doi: <https://doi.org/10.1108/TG-03-2014-0008>
44. Susha, I., Zuiderwijk, A., Janssen, M. & Grönlund, Å. (2015). Benchmarks for evaluating the progress of open data adoption usage, limitations, and lessons learned. Social Science Computer Review, 33(5), 613-630. <https://doi.org/10.1177/089443931456085>
45. Vancauwenberghe, G. & Cromptvoets, J. (2018). in van Loenen et al. (eds.), Open Data Exposed, Information Technology and Law, Series, vol 30, TMC Asser Press
46. van Loenen, B., Cromptvoets, J. & Poplin A. (2010) Open data portals as part of the open data ecosystem? Lessons learned from geoportal research.

47. van Loenen, B., Vancauwenberghe, G., Cromptvoets, J. & Dalla Corte, L. (2018). in van Loenen et al. (eds.), Open data exposed. Information Technology and Law Series, vol. 30, TMC Asser Press
48. van Loenen, B., Zuiderwijk, A., Vancauwenberghe, G., Lopez-Pellicer, F. J., Mulder, I., Alexopoulos, C., Magnussen, R., Saddiqa, M., Dulong de Rosnay, M., Cromptvoets, J., Polini, A., Re, B., & Casiano Flores, C. (2021). Towards value-creating and sustainable open data ecosystems: A comparative case study and a research agenda. *JeDEM - EJournal of EDemocracy and Open Government*, 13(2), 1 – 27, <https://doi.org/10.29379/jedem.v13i2.644>
49. van Loenen, B.; Welle Donker, F., Eijk, A., Tutic, D. & Alexopoulos, C. (2020). Towards an open data research ecosystem in Croatia.
50. van Opijnen, M., & Santos, C. (2017). On the concept of relevance in legal information retrieval. *Artif Intell Law* 25, 65–87. <https://doi.org/10.1007/s10506-017-9195-8>
51. Virkar, S., Alexopoulos, C., Stavropoulou, S., Tsekeridou, S., & Novak, A.S. (2020). User-centric decision support system design in legal informatics: a typology of users. In *Proceedings of the 13th International Conference on Theory and Practice of Electronic Governance*. Association for Computing Machinery, New York, 711–722. <https://doi.org/10.1145/3428502.3428609>
52. Virkar, S, Loukis, E., & Alexopoulos, C. (2022). A Methodology for Evaluating Advanced Legal Data Infrastructures. In *Proceedings of the 14th International Conference on Theory and Practice of Electronic Governance*. Association for Computing Machinery, New York, 80–88. <https://doi.org/10.1145/3494193.3494205>
53. Vrček, N. (2015). Životni ciklus otvorenih podataka: prema kvalitetnim informacijama javnog sektora. *Uprava u digitalno doba: otvoreni podaci*. 8. forum za javnu upravu. Zagreb: Friedrich-Ebert-Stiftung (FES) Zagreb; Institut za javnu upravu.
54. Tauberer, J. (2014). "Open Government Data: The Book, 2nd edition", <https://opengovdata.io/>
55. Welle Donker, F. & van Loenen, B. (2017). How to assess the success of the open data ecosystem? *International Journal of Digital Earth*, 10:3, 1-23. <https://doi.org/10.1080/17538947.2016.1224938>
56. Zdjelar, R., Žajdela Hrustek, N., & Vrček, N. (2020). Usage and Role of Open Government Data and Public Policies of 54+ Citizens e-Inclusion Issues. 31st Central European Conference on Information and Intelligent Systems: Proceedings, 121-129, <https://doi.org/10.5281/zenodo.8112534>
57. Zuiderwijk, A. (2015) Open data infrastructures: The design of an infrastructure to enhance the coordination of open data use.

58. Zuiderwijk, A., Janssen, M., & Parnia, A. (2013). The complementarity of open data infrastructures: Telematics and Informatics, Vol 62, <https://doi.org/10.1016/j.tele.2021.101634>.
59. Zygmuntowski, JJ, Zoboli L., & Nemitz, P. (2021). Embedding European values in data governance: a case for public data commons. Internet Policy Rev 10(3), 1–29 <https://doi.org/10.14763/2021.3.1572>
60. Žnideršič, K., Marolt, M. & Pesek, M. (2025). Overview of Recent Methodologies for Open Data Quality Assessment, Informatica, 1-24, <https://doi.org/10.15388/25-INFOR614>

B. Legal sources and official documents

European Union – Legislation and Documents

1. Directive 2003/98/EC of the European Parliament and of the Council of 17 November 2003 on the re-use of public sector information. OJ L 345, 31.12.2003, 90–96, <https://eur-lex.europa.eu/eli/dir/2003/98/oj/eng>
2. 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. OJ L 175, 27.6.2013, 1–8, <https://eur-lex.europa.eu/eli/dir/2013/37/oj>
3. Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the re-use of public sector information. OJ L 172, 26.6.2019, 56–83, <https://eur-lex.europa.eu/eli/dir/2019/1024/oj>
4. Commission Implementing Regulation (EU) 2023/138 of 21 December 2022 laying down a list of specific high-value datasets and the arrangements for their publication and re-use. OJ L 19, 20.1.2023, 43–75, https://eur-lex.europa.eu/eli/reg_impl/2023/138/oj
5. Proposal for a Directive of the European Parliament and of the Council on the re-use and commercial exploitation of public sector documents. OJ 227E, 24/09/2002, 382 – 386, <https://eur-lex.europa.eu/legal-content/LV/TXT/?uri=CELEX:52002PC0207>
6. Regulation (EU) 2022/868 of the European Parliament and of the Council of 30 May 2022 on European data governance and amending Regulation (EU) 2018/1724 (Data Governance Act). OJ L 152, 3.6.2022, 1–44, <https://eur-lex.europa.eu/eli/reg/2022/868/oj>
7. Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases. OJ L 77, 27.3.1996, 20–28, <https://eur-lex.europa.eu/eli/dir/1996/9/oj>

8. Council conclusions of 6 November 2017 on the European Legislation Identifier. OJ C 441, 22.12.2017, 8–12, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52017XG1222%2802%29>

Republic of Croatia – Legislation and Documents

1. The Right of Access to Information Act (Official Gazette, No. 25/13, 85/15, and 69/22)
2. The Ordinance on the types and content of licenses laying down conditions for the re-use of information (Official Gazette, No. 67/17)
3. The Act on Instruments of Better Regulation Policy (Official Gazette, No. 155/23)
4. The Decree on Costs for the Re-use of Information (Official Gazette, No. 87/18 and 55/24)
5. The Act on the Government of the Republic of Croatia (Official Gazette, No. 150/11, 119/14, 93/16, 118/18, 80/22, and 78/24)
6. The Regulation on the Legislation Office (Official Gazette, No. 8/25)
7. The Rules on the Publication of Laws, Other Regulations, and Acts in Narodne novine - the Official Gazette of the Republic of Croatia. KLASA: 011-03/24-01/2, URBROJ: 50501-5/1-01 23. 02. 2024, <https://zakonodavstvo.gov.hr/pravila-objave-zakona-drugih-propisa-i-akata-u-narodnim-novinama-sluzbenom-listu-republike-hrvatske/517>
8. The Government of the Republic of Croatia (2025). The Open Data Policy of the Republic of Croatia
https://mpudt.gov.hr/UserDocsImages//dokumenti/Portal%20otvorenih%20podataka.%20svibanj%202025//Politika%20otvorenih%20podataka_EN.pdf
9. Ministry of Justice, Public Administration and Digital Transformation, Open Data Policy <https://mpudt.gov.hr/open-data-policy/30146>

Republic of Slovenia – Legislation and Documents

1. The Act on Access to Public Information (ZDIJZ)
<https://pisrs.si/pregledPredpisa?id=ZAKO3336>
2. Regulation on the transmission and reuse of public information.
<https://pisrs.si/pregledPredpisa?id=URED6941>
3. The Act on Publication in the Official Gazette of the Republic of Slovenia (OGRS)
<https://pisrs.si/pregledPredpisa?id=ZAKO9190>
4. The Act on the Official Gazette of the Republic of Slovenia (ZUL)
<https://pisrs.si/pregledPredpisa?id=ZAKO470>

5. The Decree on the Legal Information System of the Republic of Slovenia
<https://www.uradni-list.si/glasilo-uradni-list-rs/vsebina/2020-01-2499/uredba-o-pravno-informacijskem-sistemu-republike-slovenije>
6. Ministry of Economic Development and Technology (2022). The Digital Strategy.
<https://www.gov.si/assets/ministrstva/MGTS/Dokumenti/DIPT/Digitalizacija/Strategija-digitalne-transformacije-gospodarstva.pdf>

Republic of France - Legislation and Documents

1. Decree No. 2011-577 of 26 May 2011 relating to the re-use of public information held by the State and its public administrative establishments
<https://www.legifrance.gouv.fr/loda/id/JORFTEXT000024072772>
2. The Digital Republic Act (Law No. 2016-1321 of 7 October 2016 for a Digital Republic) <https://www.legifrance.gouv.fr/loda/id/JORFTEXT000033202746>
3. Law No. 2015-1713 of 22 December 2015 on the dematerialization of the Official Journal of the French Republic,
<https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000031672289>
4. Decree No. 2002-1064 of 7 August 2002 relating to the public service of disseminating law via the internet,
<https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000000413818>
5. Decree of 24 June 2014 relating to the free reuse of legal and associative databases of the Directorate of Legal and Administrative Information
https://www.legifrance.gouv.fr/loda/texte_lc/JORFTEXT000029135221/2019-11-27/
6. Ordinance No. 2004-164 of February 20, 2004, concerning the procedures and effects of the publication of laws and certain administrative acts
<https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000000435289>
7. Code civil (Version 01 September 2020)
https://www.legifrance.gouv.fr/codes/texte_lc/LEGITEXT000006070721/2020-09-01
8. Decree No. 2020-1119 of 8 September 2020 relating to the modernization of the public service for the dissemination of law via the internet,
<https://www.legifrance.gouv.fr/loda/id/JORFTEXT000042319661/>

C. Other sources

1. Berends, J., Carrara, W., Engbers, W., & Vollers, H. (2020). Recommendations for Open Data Portals: from setup to sustainability. prepared by Capgemini Invent
https://data.europa.eu/sites/default/files/edp_s3wp4_sustainability_recommendations.pdf

2. Best Practice: Establish an Open Data Ecosystem (2016).
<https://www.w3.org/2013/share-psi/bp/eode/>
3. Brandusescu, A., Iglesias, C., Lämmerhirt, D., & Verhulst, S. (2019). Open data governance and open governance: interplay or disconnect?
<https://blog.okfn.org/2019/02/20/open-data-governance-and-open-governance-interplay-or-disconnect/>
4. Capgemini Invent: Page, M., Behrooz, A., & Yasin, B. (2025). 2025 Open Data Maturity Report. European Commission,
https://data.europa.eu/sites/default/files/2025-12/2025_odm_report_5.pdf
5. Castro, D. & Korte, T. (2015): Open data in the G8: A Review of Progress on Open Data Charter. Center for Data Innovation, <https://www2.datainnovation.org/2015-open-data-g8.pdf>
6. Chafetz, H., Saxena, S. & Verhulst, S. G. (2024). A Fourth Wave of Open Data? Exploring the Spectrum of Scenarios for Open Data and Generative AI. The GovLab, <https://doi.org/10.48550/arXiv.2405.04333>
7. Circular A-130 available on
https://obamawhitehouse.archives.gov/omb/circulars_a130/
8. Costa, E., Simperl, E. & Walker, J. (2020). Sustainability of (Open) Data Portals Infrastructures reports, Open Data Portal Assessment using User-oriented Metrics. European Commission, <https://data.europa.eu/doi/10.2830/51660>
9. Creative Commons: Licenses List, <https://creativecommons.org/licenses/>
10. Creative Commons: About CC Licenses, <https://creativecommons.org/share-your-work/cclicenses/>
11. Datos.gob.es (2024). Open data and generative AI: synergies and use cases.
<https://datos.gob.es/en/blog/open-data-and-generative-ai-synergies-and-use-cases>
12. Dodds, L. (2013). Publisher's Guide to Open Data Licensing. Open Data Institute, <https://theodi.org/article/publishers-guide-to-open-data-licensing/>
13. Dusséaux, A. (2016). Open Data as a Human Right: The Case of Case-Law. Open Knowledge, <https://blog.okfn.org/2016/07/27/open-data-as-a-human-right-the-case-of-case-law/>
14. ELI - European Legislation Identifier <https://eur-lex.europa.eu/content/help/eurlex-content/eli.html>
15. European Commission (2025). European legislation on open data. <https://digital-strategy.ec.europa.eu/en/policies/legislation-open-data>
16. European Commission (2024). European Data Governance Act <https://digital-strategy.ec.europa.eu/en/policies/data-governance-act>

17. European Commission (2024). Data Governance Act explained. <https://digital-strategy.ec.europa.eu/en/policies/data-governance-act-explained>
18. Global Open Data Index: Tracking the state of open government data by Open Knowledge <http://index.okfn.org/>
19. Graux, H. (2024). Granular Data Governance Systems for Open Data, A primer on the impact of the Data Governance Act on open data ecosystem. European Commission, <https://data.europa.eu/en/publications/studies>
20. Huyer, E. & van Knippenberg, L. (2020). The Economic Impact of Open Data: Opportunities for value creation in Europe. European Commission, <https://data.europa.eu/en/publications/datastories/economic-impact-open-data-opportunities-value-creation-europe>
21. Majithia, N., Carey-Wilson, T. & Simperl, E. (2025). A framework for AI-ready data. Open Data Institute, https://theodi.hacdn.io/media/documents/A_framework_for_AI-ready_data.pdf
22. Malaccorto, R. B. (2025). An anthology of AI and Open Data resources. Open Data Charter, <https://medium.com/opendatacharter/an-anthology-of-ai-and-open-data-resources-947aaf3b767d>
23. Open data and AI: A symbiotic relationship for progress (2023). <https://data.europa.eu/en/publications/datastories/open-data-and-ai-symbiotic-relationship-progress>
24. The Open Data Barometer; The methodology, <https://opendatabarometer.org/leadersedition/methodology/>
25. "Open Definition 2.1". <http://opendefinition.org/od/2.1/en/>
26. Open Government Directive available on <https://obamawhitehouse.archives.gov/open/documents/open-government-directive/>
27. Open Knowledge, What is open? <https://okfn.org/opendata/>
28. Open Knowledge, Tracking the state of open government data <https://okfn.org/en/who-we-are/our-history/global-open-data-index/>
29. Palmer, R. (2017). Measuring open data. <https://medium.com/opendatacharter/measuring-open-data-2d6dcb1851da>
30. Russell, S., Perset, K., & Grobelnik, M. (2023). Updates to the OECD's Definition of an AI System Explained. OECD.AI, <https://oecd.ai/en/wonk/ai-system-definition-update>
31. Sunlight Foundation (2010). Ten Principles for Opening Up Government Information. <https://sunlightfoundation.com/policy/documents/ten-open-data-principles/>
32. Verhulst, S. G., Zahuranec, A.J., Saxena, S., Schmoeker, A. & Chafetz, H. (2023). Toward a Fourth Wave of Open Data? The GovLab <https://medium.com/data-stewards-network/generative-ai-and-the-fourth-wave-of-open-data-cdc92ca3b390>

33. Ziesche, S. (2023). Open Data for AI: What Now? UNESCO Digital Library, 2023.
<https://unesdoc.unesco.org/ark:/48223/pf0000385841>

Annex 1: A detailed description of the applied framework

Dimension	Indicator	Key aspects	Measurement	Croatia – the Official Gazette (Narodne novine)	Slovenia - the Official Gazette and the Legal Information System	France - the Official Journal and Légifrance
Policy and Governance	Policy framework	An open data policy and strategy are in place at the national level to provide a long-term strategic vision and action plan for open data	0 - no policy 1 - some policy elements in other frameworks with some OD principles 2 - specific policy in place with some OD principles 3 - specific OD policy adopted and containing most or all OD principles (5 or more)	3	3	3
		The policy incentivizes open data re-use and access to real-time data and requires the public authorities to publish OD. Activities regarding high-value datasets are in place.	0 - no 1 - yes, only national level 2 - yes, all public bodies	1	2	2
		Open data awareness exists at all levels in the organization.	0 - no 1 - yes, only national level 2 - yes, all public bodies	1	2	2
		Political support - Leadership: Open data policy is adequately supported at the political level.	0 - no support 1 - policy adopted by a body headed by political figure; 2 policy adopted and monitored by a body headed by political figure	2	2	2
		Total		advanced	very advanced	very advanced
	Governance of open data	Governance models and regular coordination activities are in place to ensure open data publication and to support open data initiatives.	0 - no 1 - basic support combined with other tasks 2 - designated authority (OD as one of the task) but OD as a side job for the employees 3 - designated authority (e.g. body which has OD as one of the major tasks) with some people being employed 100% on open data activities	1	2	3
		The existence and nature of a specific legal instrument establishing the legislative portal	0 - no; 1 - yes, decree or similar: 2- yes, article in Constitution or law	1	1	1
	Governance of open data	The identification of the responsible government body and its organizational structure, and the lines of accountability for portal management.	0 - no - private; 1 - yes, designated authority (lower level); 2 - yes, designated authority (high level such as government or ministry)	1	2	2

		The organizational structure of the publishing entity (including whether the publisher is a public or private company)	0 - no organizational structure; 1 - designated authority (but a legislative portal is only one of a few business activities); 2 - yes, portal management (a legislative portal is only a business)	1	1	2
		Open data awareness/strategic awareness activities	0 - no 1 – yes, basic 2 – yes, coordinated and continuous training and OD culture in-house	1	2	2
		The sources of funding, specifying whether the portal is financed through the national budget or alternative mechanisms.	0 - no - subscriptions, sales revenue; 1 – yes, national budget funding	0	1	1
		Total		Moderate	Advanced	Very Advanced
	Open data implementation	Data publication plans and implementation processes are in place, encompassing whether the legislative portal has an organizational open data strategy with clearly defined processes, responsibilities, timelines, and resources	0 - no 1 – yes, basic 2 – yes, but with limited coordination and training on OD, 3 – yes, coordinated and continuous training and OD culture in-house	1	2	3
		The level of commitment to publishing open data	0 - no 1 – yes, basic 2 – yes, coordinated and continuous, 3 – yes, high, coordinated and continuous	1	3	3
		Type of information and coverage, and the standardization of the data publication process	0 - no 1 – yes, basic 2 – yes, moderate, 3 – yes, high and coordinated	1	2	3
		The presence of a licensing scheme	0 - no 1 - yes, standard open licensing models are applicable or national licensing rules 2 - yes, with public domain or CC BY being advised for	1	2	2
		The legal framework promotes free access to data (no or marginal costs)	0 - no 1 – yes	1	1	1
		Total		Moderate	Advanced	Very Advanced

Data Quality	Metadata timeliness and completeness	A systematic approach is implemented to ensure that metadata remains up to date. There is a defined data standard that is used.	0 - no 1 – yes, limited, 2 – yes, advanced	1	2	2
		Automated harvesting programs are employed to capture changes at the source and reflect them on the legislative portal with minimal delay.	0 - no 1 – yes, limited 2 -yes, advanced	0	1	2
		The portal offers access to a wide range of both historical and contemporary data.	0 - no; 1-national; 2 - national and local; 3 -national, local and EU	0	2	3
		Total		Moderate	Advanced	Very Advanced
	Monitoring and measures	Mechanisms are in place to monitor metadata quality on the legislative portal and compliance with required standards and licensing.	0 - no 1 - yes	0	1	1
		Measures are in place to publish high-quality metadata and select the appropriate license for the data.	0 - no 1 – yes, limited, 2 – yes, advanced	0	2	2
	Metadata quality and compliance with the required standard	A model is used to assess the quality of data and metadata deployment, observing the percentage of published open data that meets specific deployment quality requirements, such as including links to other data sources, with improvements monitored over time.	0 - no 1 – yes, basic, 2 - yes, advanced	0	1	2
		Compliance with required standards is also systematically tracked (e.g. RDF Compliance).	0 - no 1 – yes, 2 - yes high	0	1	2
		Total		Basic	Advanced	Very Advanced
	Availability of data (Technical Openness)	Publicly accessible online without restrictive barriers (e.g. no mandatory registration or	0 - no 1 - yes	1	1	1

Data Availability		proprietary software)				
		Machine-readable, provided in structured, non-proprietary formats (such as CSV, JSON, XML)	0 – no; 1 – yes, basic; 2 -yes, advanced	1	2	2
		Downloadable in bulk	0 – no; 1 – yes, basic; 2 -yes, advanced	1	1	2
		Stable URLs or Application Programming Interface (API) services that allow automated access	0 – no; 1 – yes, basic; 2 -yes, advanced	1	2	2
		Total		Moderate	Advanced	Very Advance
	Availability of data (Pricing model)	The extent to which data is made available free of charge or under cost structures that do not restrict access or reuse.	0 – no, fee 1 – yes, small fee, 21 – yes, free of charge	1	1	2
				Advanced	Advanced	Very Advanced
	Data completeness and data search function	The dataset includes all relevant records, attributes, and time periods needed to fully represent the subject it covers.	0 - no 1 – yes, basic, 2 - yes, advanced	0	1	2
		An effective open data search - users can easily discover and locate datasets within an open data portal (data indexing, search capabilities, multiple field search, filter options).	0 – no; 1 – yes, basic; 2 -yes, advanced	0	1	2
		Total		Moderate	Advanced	Very advanced
Portal	Portal functionalities and features	Portal ensures free access to datasets and relevant content. Access is free, no fee. Registration/login is not required to access data.	0 - yes - upon fee; 1 -no -free	1	1	1
		Coverage: type of legal data that is available	0 - some national; 1- national; 2 - national and local; 3 - national, local, and EU; 4 - national, local, EU, and national and EU case law, link to other legal databases	2	3	4
		What data format is provided (HTML, XML, PDF, RTF)	0 - PDF; 1 - PDF, HTML; 2 - PDF, HTML, XML, RTF	1	2	2

		The basic search by title, year, number, and keywords. Basic navigation includes thematic navigation.	0 - no 1 - yes	1	1	1
		Portal includes more advanced features such as discussion forums, mechanisms for requesting datasets, and transparency into the status of requested datasets	0 - no 1 - yes	0	0	0
		Data are available in both the national language and English (multilingual data)	0 - no; 1 - yes, some; 2 -yes, all	0	0	1
		The platform's capabilities for dataset linking and visualization	0 - no 1 - yes	0	1	1
		The availability of user support mechanisms, including FAQs, tutorials, guidance materials, and navigational assistance.	0 - no; 1 - yes, some; 2 -yes, all	0	1	1
		Support and help for users	0-no; 1- yes - help desk, ask questions, report a problem...	0	1	1
		Total		Moderate	Advanced	Advanced
	Portal usage	Ease of usage, performance, effort, service quality	Likert scale 0-5	2	4	5
		Traffic to the portal is monitored, and analytics tools are used to gain insights into users' behavior and the most and least consulted data categories (use statistics – a number of visitors; a number of downloads available)	0 - no 1 – yes, basic 2 -yes – advanced, 3 -yes – advanced with developed analytics tools	0	1	2
		Total		Limited	Moderate	Advanced
	Portal Sustainability	A strategy to ensure the sustainability of the portal has been determined. User surveys are conducted regularly and feed into a review process to improve the portal.	0 - no 1 – yes, basic, 2 – yes, basic with review process to improve, , 3 – yes, high with performing regular review	0	1	3
		Total		Limited	Basic	Advanced
		Total		Limited	Basic	Advanced

Annex 1.1. Explanation of the ratings applied to the determined dimensions during the assessment of legislative portals:

1. Policy and Governance

- **Limited:** No comprehensive open data policy; responsibilities are unclear.
- **Basic:** Basic policy framework exists but implementation is inconsistent.
- **Moderate:** Policy framework is operational with some governance mechanisms.
- **Advanced:** Strong governance structure with clear responsibilities and implementation.
- **Very Advanced:** Fully integrated policy ecosystem with strategic leadership, monitoring, and continuous improvement.

2. Data Quality

- **Limited:** Metadata is often incomplete, outdated, or non-standardized.
- **Basic:** Metadata is available for some datasets but lacks consistency and quality controls.
- **Moderate:** Regular quality checks and reasonable metadata compliance.
- **Advanced:** Systematic monitoring ensures high-quality, complete, and timely metadata.
- **Very Advanced:** Automated quality assurance, full standards compliance, and continuous quality improvement.

3. Data Availability

- **Limited:** Few datasets are available, difficult to find, or subject to restrictions.
- **Basic:** Core datasets are published but with limited openness or usability.
- **Moderate:** Broad dataset availability with improving accessibility and completeness.
- **Advanced:** Most datasets are openly available, machine-readable, and easily discoverable.
- **Very Advanced:** Comprehensive, free, interoperable, and highly reusable data ecosystem.

4. Portal

- **Limited:** Portal offers basic access to datasets but has low usage and limited sustainability.
- **Basic:** Essential portal functions exist with moderate user engagement.
- **Moderate:** Good functionality and user experience, but some features or support services are missing.
- **Advanced:** Rich functionality, strong user engagement, analytics, and sustainable management.
- **Very Advanced:** State-of-the-art portal with advanced features, high usage, continuous innovation, and long-term sustainability.