



UNIVERSITY OF
AEGEAN

SCHOOL OF
ENGINEERING

DEPARTMENT OF
INFORMATION AND
COMMUNICATION
SYSTEMS
ENGINEERING (ICSD)

POSTGRADUATE
PROGRAM
MASTER OF
ENGINEERING IN
SCIENCE:
RESEARCH ON
INFORMATION AND
COMMUNICATION
SYSTEMS

INFORMATION
SYSTEMS LABORATORY
(ISL)

DIGITAL GOVERNMENT
RESEARCH CENTER
(DGRC)



Research in Interoperability Frameworks and eGovernment Policies for Public Sector: The case of Greece

The Diploma Thesis

Appeared before

Of the Examination Committee

Of the University of the Aegean

A Thesis

Presented in Fulfilment of the Requirements for

The Degree of Master of Engineering in Science: Research on Information and
Communication Systems

School of Engineering

Department of Information and Communication Systems Engineering

By

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February 2020

Η ΤΡΙΜΕΛΗΣ ΕΠΙΤΡΟΠΗ ΔΙΔΑΣΚΟΝΤΩΝ
ΕΠΙΚΥΡΩΝΕΙ ΤΗ ΔΙΠΛΩΜΑΤΙΚΗ ΕΡΓΑΣΙΑ
ΤΗΣ/
ΒΙΚΤΩΡΙΑ ΚΑΛΟΓΗΡΟΥ

ΧΑΡΑΛΑΜΠΙΔΗΣ ΙΩΑΝΝΗΣ, Επιβλέπων 07/02/2020
Καθηγητής
Τμήμα Μηχανικών Πληροφοριακών
και Επικοινωνιακών Συστημάτων

ΛΟΥΚΗΣ ΕΥΡΙΠΙΔΗΣ, Μέλος
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ΠΑΝΕΠΙΣΤΗΜΙΟ ΑΙΓΑΙΟΥ
ΦΕΒΡΟΥΑΡΙΟΣ 2020

Τίτλος: “Πλαίσια Διαλειτουργικότητας και Πολιτικές Ηλεκτρονικής Διακυβέρνησης για το Δημόσιο Τομέα: Η περίπτωση της Ελλάδας”

Περίληψη

Ο ρόλος της διαλειτουργικότητας στις ηλεκτρονικές υπηρεσίες είναι καθοριστικός. Η Ευρωπαϊκή Επιτροπή με το πρόγραμμα ISA² και τα προγενέστερα προγράμματα ISA και IDA αναγνώρισε σε πρώιμο στάδιο την ανάγκη για διαλειτουργικότητα. Οι αποτελεσματικές υπηρεσίες Δημόσιας Διοίκησης για επιχειρήσεις και πολίτες αποτελεί προτεραιότητα τόσο για τα Ευρωπαϊκά θεσμικά όργανα όσο και για τα κράτη μέλη, προς τη δημιουργία πολιτικών, στρατηγικών, οδηγιών, συστάσεων και κοινών πλαισίων σε όλα τα επίπεδα των υπηρεσιών και των βασικών δομικών μονάδων τους. Το 2004 δημοσιεύθηκε το πρώτο Ευρωπαϊκό Πλαίσιο Διαλειτουργικότητας (ΕυΠΔ) για την καθοδήγηση Δημοσίων Διοικήσεων για διαλειτουργικές διασυννοριακές υπηρεσίες. Τα επόμενα έτη, το πλαίσιο αναθεωρήθηκε δύο φορές αποτελώντας σήμερα σημαντική αναφορά για τα περισσότερα Εθνικά Πλαίσια Διαλειτουργικότητας (ΕΘΠΔ) αλλά και τις ψηφιακές στρατηγικές στην Ευρώπη. Παρόλο που έχουν συντελεστεί πολλά στον τομέα αυτό, η διαλειτουργικότητα δεν έχει φτάσει το μέγιστο των δυνατοτήτων της ως βασικός παράγοντας για τον ψηφιακό μετασχηματισμό. Στην Ελλάδα και σε άλλες χώρες αυτή η δυνατότητα είναι πολύπλοκη και απαιτεί όχι μόνο την αλληλεπίδραση των σωστών εργαλείων αλλά και των κατάλληλων ανθρώπων. Η έρευνα αυτή παρουσιάζει τον σημαντικό ρόλο της διαλειτουργικότητας και των βασικών συναφών πλαισίων και πολιτικών με έμφαση το ΕυΠΔ. Εν συνεχεία, περιγράφεται η εφαρμογή του στα κράτη μέλη συγκρίνοντας τα κοινά στοιχεία και τις σημαντικές διαφορές μεταξύ των διαφόρων εκδόσεων του και προτείνονται νέες κατευθύνσεις. Επιπλέον, εξετάζεται το Ελληνικό Πλαίσιο Διαλειτουργικότητας (ΕΛΠΔ) και προβάλλονται προτάσεις για την ενημέρωσή του πέρα από το ΕυΠΔ, λαμβάνοντας υπόψη το πολύπλοκο περιβάλλον διαλειτουργικότητας και υπηρεσιών ηλεκτρονικής διακυβέρνησης.

Keywords: Διαλειτουργικότητα, Ηλεκτρονική Διακυβέρνηση, Ευρωπαϊκό Πλαίσιο Διαλειτουργικότητας (ΕυΠΔ), Ελληνικό Πλαίσιο Διαλειτουργικότητας (ΕΛΠΔ), Δημόσια Διοίκηση, Διασυννοριακές Δημόσιες Υπηρεσίες

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Βικτώρια Καλογήρου

Τμήμα Μηχανικών Πληροφοριακών και Επικοινωνιακών Συστημάτων

ΠΑΝΕΠΙΣΤΗΜΙΟ ΑΙΓΑΙΟΥ

Abstract

The role of interoperability in electronic services is crucial. The European Commission (EC) – with the launch of the ISA2 and its predecessor programmes ISA and IDA – acknowledged the need for interoperability at an early stage. Effective Public Administration (PA) services towards businesses and citizens is a priority for both European Institutions and Member States. Thus, the focus is on creating policies, strategies, directives, recommendations and common frameworks that could tackle all levels of services, including their key building blocks. In 2004 the first European Interoperability Framework (EIF) for pan-European eGovernment Services was published, providing guidance to Public Administrations regarding interoperable cross border services. Since then, the framework has been revised twice and has been established as a leading reference and basis for the majority of National Interoperability Frameworks (NIFs), as well as, digital strategies across Europe. Despite the noticeable progress in this field, interoperability still has not reached its full potential as a main enabler for Digital Transformation. In Greece, as in other countries, taking advantage of this potential is complex and requires not only the interaction of the right tools but also of the right people. This research focuses on EIF and identifies the important role of interoperability and its associated major frameworks and policies. It describes EIF's implementation by Member States, compares common assets and significant differences between various EIF versions, and proposes new directions. Furthermore, the Greek Interoperability Framework – eGIF – is studied and proposals for updating it beyond EIF are made, taking into consideration the complexity of the interoperability and eGovernment services environment.

Keywords: Interoperability (IoP), eGovernment (eGov), European Interoperability Framework (EIF), Ελληνικό Πλαίσιο Διαλειτουργικότητας (e-GIF), Public Administration (PA), cross border public services

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EΥΧΑΡΙΣΤΙΕΣ

θα ήθελα να ευχαριστήσω:

Αυτές και Αυτούς που πιστέψαν σε εμένα και με παρότρυναν να προχωρήσω

Την οικογένεια μου

Τον επιβλέποντα Καθηγητή μου κ. Γιάννη Χαραλαμπίδη που με καθοδήγησε αλλά και συνέβαλε καταλυτικά στην επιτυχή ολοκλήρωση των σπουδών μου

Τον Καθηγητή κ. Ευριπίδη Λουκή για την αστείρευτη παροχή γνώσης

Τους συμφοιτητές στο Μεταπτυχιακό Πρόγραμμα Σπουδών “Τεχνολογίες και Διοίκηση Πληροφοριακών Συστημάτων” για την υποστήριξη και ανταλλαγή γνώσεων

Τους συναδέλφους μου στο τμήμα Διαλειτουργικότητας ISA² της Γενικής Διεύθυνσης Πληροφορικής της Ευρωπαϊκής Ένωσης και τους συναδέλφους στο Υπουργείο Διοικητικής Ανασυγκρότησης και Ηλεκτρονικής Διακυβέρνησης για την συνεργασία και ανταλλαγή γνώσεων.

ACKNOWLEDGMENTS

The information and views set out in this research are those of the author and do not reflect the official opinion of European Commission (EC).

The author would like to thank for their support the colleagues of Unit D2 (ISA² - Interoperability Unit), Directorate-General of Informatics (DG – DIGIT), European Commission and the colleagues from joinup team.

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1. Introduction

This chapter presents the rationale, objectives, and contribution of this research, along with the structure of the document.

1.2 Rationale

Interoperability between Public Administrations (PAs) was acknowledged by the European Commission (EC) with the launch of the Interchange of Data between Administrations (IDA) programme. In 2004 under the IDA, the first framework was published – the European Interoperability Framework for pan-European eGovernment Services (EIF version 1). It was followed by EIF version 2 in 2010, under the ISA programme, and in 2017, the current version – EIF version 3 – was released under the ISA² programme. These frameworks, along with the EC supported strategies, action plans and dedicated programmes have been providing guidance to Public Administrations on how to improve interoperability and increase cross-border services. EIF has become a leading reference and comprises a basis for the majority of National Interoperability Frameworks (NIFs) and strategies in Europe. However, despite the noticeable progress and use of new technologies, interoperability still has not reached its full potential. Several barriers still exist that prohibit the provision of seamless digital public services, not only at National levels but also in cross-border and cross-sector services, hindering thus proper interoperability to citizens. In addition, as examined in articles [1] and [2] that are part of this research, several studies and other research identify Interoperability (IOP) as a crucial factor for public sector digital services, despite the complexity of the interoperability and eGovernment services environment. Nonetheless, IOP facilitates public digital services to be transparent, domain agnostic and helps them interact efficiently across borders with the use of common frameworks, standards, and processes for sharing information, data, and processes. Thus, EIF provides guidelines to Public Administrations on how they can supply interoperable, efficient and effective public services to citizens and businesses. EIF, being a mature interoperability framework, could prove beneficiary to the current Greek National Interoperability Framework (eGIF) by aligning the latter with the latest EIF version and further beyond, increasing the broader impact of Greek digital government and digitisation. The implementation of such proposed changes in key sectors such as Health or Finance could boost the country's economy

1.3 Objectives

The aim of this thesis is to identify the reasons in which interoperability is a key factor for digital services, and further to what interoperability can offer to Public Administrations. Also, to scale this importance at national level by justifying the reason for an update of the Greek National Interoperability Framework (eGIF) beyond the EIF. Initially, it compares the several versions of EIF from 2004 to the present, the major changes, the principles and/or recommendations that are still important today – or are still an obstacle in achieving harmonised national or cross-border online digital public services. It presents the National Interoperability Frameworks that are aligned with EIF, along with the main differences as these appear in the most advanced technological countries when compared to the lesser technological ones. Subsequently, the second objective of this thesis concerns the status of the Greek Interoperability Framework, with an approach for its update and identification of the criteria for assessing proposals of such an update. Last but not least, this thesis aims to be one of the triggers and reference points not only for a potential update of eGIF, but also for its actual implementation by Greek Public Administrations.

1.4 Contribution

The outcome of this thesis can contribute to the implementation of the following:

- Building upon research from literature review and desk research, this study analyses and provides recommendations that could be taken into consideration for the evaluation and upcoming versions of EIF.
- Providing input for the update of the National Greek Interoperability Framework (eGIF), based not only on the alignment with the current version of EIF (version 3) but even beyond it. Currently there is no published work related to the update of the framework; the proposals of this work could become a basis – in conjunction with new legal and policy provisions – so that eGIF can be more sustainable and adaptive to national framework changes. The work in this thesis also aims to provide practical proposals for defining an interoperable Governance and Policy-Making mechanism. The thesis concludes with concrete proposals for the update of eGIF.

1.5 Structure

The structure of this document is as follows: initially, the Abstract of this thesis is presented in the Greek and English languages, followed by Chapter 1 – the Introduction, which includes the Rationale, Objectives, Contribution and Structure. Chapter 2 follows, presenting mainly the literature/articles review and desk research, along with definitions and the status of interoperability in Europe and Greece; this chapter also includes an overview of the interoperability timeline and related organisations. In Chapter 3, the methodology and research questions are presented, along with the methods and tools that were used. Chapter 4 contains the first article concerning the review and gap analysis of European Interoperability Frameworks, including the findings, conclusions, and further work. Chapter 5 consists of the work of the second article, which relates to the proposed update of the Greek eGov Framework, the eGIF; in this chapter – and following the eGIF review –, there is a proposal for its update and next steps. In the ensuing Chapter 6, a questionnaire is proposed for the assessment and evaluation of the suggested framework changes. Chapter 7 contains the conclusions of the current work with the limitations and best practices that could be reused, along with possible next steps. Finally, apart from the references in Chapter 8, Chapter 9 consists of the Annex, which includes: Findings of the comparison between EIFs and EIF v3 with NIFs, Questionnaire in Greek language for eGIF, List of Organisations, List of Terminology (EN-EL), and information about the Author.

2. The Landscape

In the European Union, effective public services, common standards and interoperability are identified as priorities for European countries, since these help improve their economies and societies. In line with this, the European Commission, to maximise the full potential of the European Digital Economy and of its society, set in forth the Digital Single Market (DSM) Strategy [3]. Initially, in 2014, the President of the European Commission (EC) Jean-Claude Juncker, in his ten political priorities clearly stated *“the need for a modern public administration”* [4]. The mission letters to Vice-President Andrus Ansip – responsible for the DSM –, and to Commissioner Günther Oettinger – responsible for Digital Economy and Society and in charge of the European Commission Directorate-General for Informatics (DG DIGIT)¹ – stated the need to provide *“[...] support to make public administration more open and effective by championing the digital and eGovernment approaches across all Member States [...]”* [5] [6]. In 2019, in the political guidelines of Ursula von der Leyen – President of the EC – is stated that *“[...] the public sector has an important role in stimulating digital transformation and a new Digital Services Act will upgrade our liability and safety rules for digital platforms, services and products, and complete our Digital Single Market.”* [7] In this EC strategy, one of the six (6) priorities for 2019-2024 is “Europe Fit for the Digital Age” [8] that aims to empower people with a new generation of technologies. In one of the policy areas of this priority, in “Economy and Society”, one of the objectives is to define priorities for standards and interoperability and especially to those *“[...] that belong to critical areas to the Digital Single Market, such as health, transport, planning and energy.”* [9] Global and European eGovernment (aka e-government, or eGov) services need to provide citizens with real-time access to public information, lowering, thus, transaction costs and achieving an economic boost to innovation and growth [10].

2.1 Interoperability Definitions

In the following chapters, the definitions of IOP, the related policies, the initiatives and the organisations are further described, followed by the status of interoperability mainly in Europe, outside of Europe, and finally in Greece.

The term interoperability was – most probably – first introduced in 1949 by NATO², in which interoperability is the ability to act together coherently, effectively and efficiently to achieve allied tactical, operational and strategic objectives. According to the Institute of Electrical and Electronics Engineers³ (IEEE) 1991 glossary [11], interoperability is described as *“[...] the ability of two or more systems or components to exchange information and to use the information that has been exchanged.”* Most recently, and according to a working group for interoperability⁴, the term was updated to a *“[...] characteristic of a product or system, whose interfaces are completely understood, to work with other products or systems, present or future, in either implementation or access, without any restrictions.”* In the Information Technology (IT) sector, the term interoperability simply refers to the ability of two systems to work with one another, or the ideal way for computers and other electronic devices to work together; but interoperability is not limited to computers and machines since it is a term – and characteristic – that describes, in general, the ability to assist in collaborating together.

To describe the concept of interoperability and, specifically, how it applies in the field of eGovernment, we need to understand the plethora of references around this field, and especially how it relates to public services, along with other areas that are affected – besides the financial or technological ones – for example, scientific, entrepreneurial, societal and political. One of

¹ European Commission, Departments (Directorates-General) and services: http://ec.europa.eu/about/ds_en.htm

²NATO North Atlantic Treaty Organisation:
https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_publications/20120116_interoperability-en.pdf

³ IEEE: The Institute of Electrical and Electronics Engineers is a professional association for electronic engineering and electrical engineering <https://www.ieee.org/>

⁴ Groupe de travail sur l'interopérabilité: <https://aful.org/gdt/interop>

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the most important governmental reforms is the use of Information and communications technology (ICT) in public service which, not only increases transparency, but also creates opportunities for democratic participation and a cheaper, more service-oriented government [12] [13] [14]. A principle for the conception and deployment of e-government initiatives and public services is interoperability (IOP); and, the interoperability frameworks have been the tool for implementing the principle [15]. Furthermore, according to citation [16], “[...]/ improved interoperability between public organizations as well as between public and private organizations is of critical importance to make electronic government more successful”; while according to citation [17], “Interoperability (IOP) is one of the most important aspects for Government services.” eGovernment (or eGov) IOP has focused on implementing and using IOP services in their system for the public services [18]. IOP is not just a key enabler for an interconnected government and public services, but also a key enabler for productive and efficient cross-border and cross-sector public services [19]. In addition, IOP remains a key factor of success for enterprises that share and exchange processes, services data and resources in a collaborative context [20]. Moreover, IOP can further convey important value and contribution to the progress of the Digital Single Market (DSM) [3], thus paving the way for the free movement of goods, capital, services and people which are the fundamental freedoms that underpin the European Union (EU) single market [21] [22].

According to the EIF v2 [23]: *“Interoperability, within the context of European public service delivery; is the ability of disparate and diverse organisations to interact towards mutually beneficial and agreed common goals, involving the sharing of information and knowledge between the organisations; through the business processes they support; by means of the exchange of data between their respective Information and Communications Technology (ICT) systems.”* In EIF v3 [24] [25], IOP is tackled as *“the ability of organisations to interact towards mutually beneficial goals, involving the sharing of information and knowledge between these organisations, through the business processes they support, by means of the exchange of data between their ICT systems.”* IOP is of utmost importance for effective eGovernment (eGov) with efficient and transparent services [26] that are open to the citizens. IOP has an effective value for eGov because it can minimise administrative burden, costs and time, foster innovation, facilitate reuse, improve security with an impact on growth and competitiveness, and enhance public and private policy goals thus leading to better decision making. As stated in citation [27], IOP is also a thriving research domain for all applicable areas: scientific, entrepreneurial, societal and political. IOP is multisector and can play a significant role in accelerating the Internet of Things (IoT), eHealth, eBusiness, cloud services, intelligent transport systems, cybersecurity, and improving the data driven economy. In order to accomplish interoperability in eGov the combination of organisational changes (regulation, policy-making with expertise and opinion-shaping processes with all relevant stakeholders) are needed. Although the creation of IOP and its integration is a complex endeavour [28] [29], the lack of interoperability appears as the most long-lasting and challenging problem [30]; therefore organisations and departments should act as an integrated whole towards the public to accomplish significant progress at all levels of public administration, with IOP as a fundamental requirement [31]. However, as stated in the EIF strategy [24], IOP is a key factor and *“Member States are digitising their public administrations (PAs) to save time, reduce costs, increase transparency, and improve both data quality and the delivery of public services.”*

Still, digital public services are not yet a reality in the EU, as shown by the 2016 Digital Economy and Society Index for eGov [32]. When it comes to cross-border services in the Union, the situation is even more challenging as there are still barriers to access cross-border services [33]. Moreover, although a lot of attention has been given to interoperability, from EU MSs, the gap is still very wide [34]. To reduce this considerable gap calls for highlighting the good practices that show what is achievable with relatively low complexity [35].

Therefore, a holistic and standardised approach, that is coordinated on a European and National level, and further – on a local level – is required for IOP to accomplish the promotion of interaction across borders and sectors, and diminish fragmentation of services and data [25]. There is a need for a global framework and global approach for administrations [36]. EIF is a

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commonly agreed approach to the delivery of European public services in an interoperable manner [37]. EIF provides guidance to PAs with a set of recommendations and is the basis for the majority of the national IOP frameworks, NIFs and strategies [25]. It covers important topics which underlie ICT technologies across sectors and, therefore, IOP, too, and it properly defines requirements and standardisation [38] [39] [20] [19]. A requirement is composed of standards, reference models, and vocabularies [40]. The European Standards are essential components of the pillars of the EU's DSM [41], and EIF paves the way to a coordinated model among Member States (MS). This global framework and approach need to be implemented in PAs eGov services in each MS. MSs should further enforce this global approach also in their services, since still in several eGov services [42], despite the progress, the required level of IOP has not been reached [43]. The PA systems' complexity, multiplicity and diversity in the public sector is posing extreme challenges to common interoperability standards [17] and eGovernment Interoperability Frameworks (eGIFs) that can provide fully electronic services [44]. EIS, along with NIFs, can pave the way for this. As stated in citation [45], *"[...] heterogeneous administrative entities must have some way to electronically exchange meaningful information in ways acceptable to all."* Although, as stated, there is still a gap from policy to actual implementation, and a need to measure and enforce IOP to a plethora of different operational needs such as: different business processes, different requirements, different specifications, and, consequently, to different technical solutions and implementations.

The use of cross-border services increase not only growth and the economy, and accomplishing cross-border IOP for e-government services [3], makes Interoperability (IOP) a crucial and important element between public sector organisations, between enterprises – to achieve corporate goals, between IT systems of cooperating companies or organisations, between different systems and their data, between heterogeneous processes of cooperating businesses and organisations. eGovernment, operating as a platform for sustainable development, can generate public value and a range of people-centred benefits. The public sector as a platform for ICT use can facilitate sustainable development [46], and can support an ecosystem of stakeholders with changing roles and relationships [47]. There is a need to consider both virtual and physical platforms, as well as their inter-relationships, to support public co-creation value with other actors [48]. Interoperability (IOP) is important for effective eGovernment (eGov) [3] [19], it can minimise administrative burden, costs and time, foster innovation, facilitate reuse, improve security with an impact on growth and competitiveness, and enhance public and private policy goals for better decision-making [22]. According to citation [24], IOP is a key factor and MSs are digitising their Public Administrations (PAs) to save time, reduce costs, increase transparency, and improve both data quality and the delivery of public services. In the European Interoperability Framework (EIF) [24], interoperability *"[...] is the ability of organizations to interact towards mutually beneficial goals, involving the sharing of information and knowledge between these organizations, through the business processes they support, by means of the exchange of data between their ICT systems."* In order to have mature systems, a balanced research from both the technological and business-level areas is needed that will lead to mature and widely applicable interoperability architectures, methods and standards [49]. In 2016, in the eGovernment Action Plan 2016–2020 [50], interoperability by default is referred as a key principle, to accelerate the digital transformation of government on setting up digital public services, while EIF is a guideline to the digitalisation of Public Administrations. In 2017, in the eGovernment Tallinn Ministerial Declaration [51], IOP is one of the principles and cornerstones of the Digital Single Market (DSM) [3], extending interoperability for public services with the adoption of EIF. Interoperability and EIF are thus important factors to take into consideration for the digitalisation and eGovernment of PAs. In brief, interoperability is important: between public sector organisations to achieve quick and inexpensive services; between enterprises, to achieve corporate goals; between IT systems of cooperating companies or organisations; between different systems and their data that should cooperate; between processes (business processes) but heterogeneous cooperating businesses and organisations.

2.2 Interoperability in Europe

In Europe, the need for standardisation and interoperable systems started almost at the same time with the digital evolution. Several steps to promote IOP started almost thirty years ago as shown in the following figure.

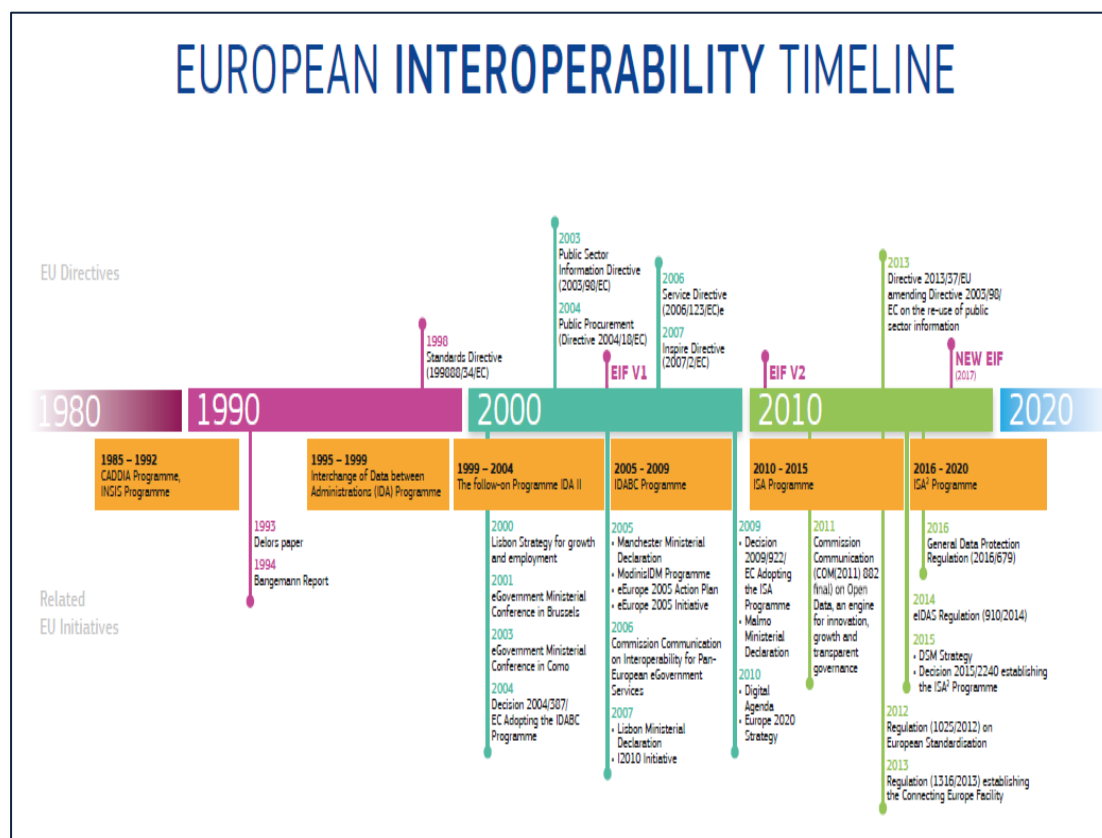


Figure 1. European Interoperability Timeline⁵ (Source: ISA²)

The IOP concept in the EU started with the launch of the European Commission (EC) programme CADDIA [52] in 1985, followed by the IDABC [53] programme in 1995. The Adoption of the ISA programme in 2009 (Decision 2009/922/EC) and the establishment of the current Interoperability Solutions for European PAs, (ISA²) programme in 2016 along with several EU Directives, strategies, policies, initiatives, Ministerial Declarations and e-Government Action Plans⁶.

Several EU and EC initiatives support IOP from EIF v1 [54] in 2004, and to the 2010 Communication (COM) (2010/7444/EC) [23] from the EC, 'Towards interoperability for European public services' with European Interoperability Strategy EIS and EIF v2. In 2017, the COM (2017/134/EC) with EIS, Action Plan. In addition, there were several initiatives, communications, directives, and strategies at the European level⁷ such as:

⁵ European Commission, ISA², Multimedia library of the ISA² programme, Infographics and posters: (https://ec.europa.eu/isa2/sites/isa/files/docs/publications/european_interoperability_timeline.pdf)

⁶ The first eGovernment Action Plan "i2010 eGovernment Action Plan" covered the period 2006-2010, the second the period 2011-2015: (<https://ec.europa.eu/digital-single-market/news/mid-term-evaluation-e-government-action-plan-2011-2015-implementation-smart-2012-006020>) and the current one the period 2016-2020 : (<https://ec.europa.eu/digital-single-market/en/egovernment-action-plan-digitising-european-industry>).

⁷ This is an indicative list at the time of writing this thesis.

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- The Manchester and the Lisbon Ministerial Declarations (2005);
- The eEUROPE 2005 initiative and Action plan;
- The ModinislDM programme (2005);
- The COM on IOP for Pan- European eGovernment Services (2006);
- The Service Directive (2006/123/EC);
- The Inspire Directive (2007/2/EC);
- The Malmo Ministerial Declaration (2009);
- The COM on Open Data (2011/882);
- The Digital Agenda and the Europe 2020 strategy;
- The Regulation on European Standardisation (1025/2012);
- The Regulation establishing the Connecting Europe Facility (1316/2013);
- The Directive on the re-use of public information (2013/37/EU);
- The eIDAS Regulation (910/2014);
- The DSM Strategy (2015);
- The General Data Protection Regulation (2016/679);
- The European Commission Digital Strategy (COM (2018)7118) for the support of Public Administration modernisation to ensure co-funding for the implementation of digital solutions for the administrations of MS such as the EIF implementation and monitoring [55].

All these initiatives have paved the way so far, but still have a long way to go since the implementation of IOP is still behind in several MSs according to NIFO results. The current e-Government Action Plan 2016-2020 [50] aims to accelerate the digital transformation of government and has IOP, by default, on setting up digital public services as a key principle, and the application of EIF is a needed action for its implementation. In 2017, EIF v3 was included as a guideline for the digitalisation of PAs in the eGov Ministerial declaration [56]. The adoption of extending the IOP for public services with the adoption of EIF and standards was one of the three pillars⁸ for economic and societal growth of DSM initiatives in 2015. As stated in the DSM, *“IOP as a prerequisite for “efficient connections across borders, between communities and between public services and authorities.”* [3] In the mid-term evaluation of the eGovernment Action Plan 2011-2015 implementation [57] [58], IOP was among the main themes for modernising PAs.

However, although there is this plethora of actions to promote ICT, digital services and, thus, interoperability, still the actual implementation is behind. As it was presented in 2016, the average implementation for interoperability in comparison with DESI⁹ data for Public Services (eGovernment and eHealth) from 2016 was 40% [59].

⁸ Pillar 3 of DSM is maximising the growth potential of the digital economy and define priorities for standards and interoperability in areas critical to the Digital Single Market, such as e-health, transport planning or energy: (http://europa.eu/rapid/press-release_IP-15-4919_en.htm)

⁹ The Digital Economy and Society Index (DESI) is a composite index published every year by the European Commission since 2014, measuring the progress of EU countries towards a digital economy and society (<https://ec.europa.eu/digital-single-market/en/desi>). The majority of DESI indicators come from the surveys of Eurostat and some broadband indicators are from the Member States through the Communications Committee.

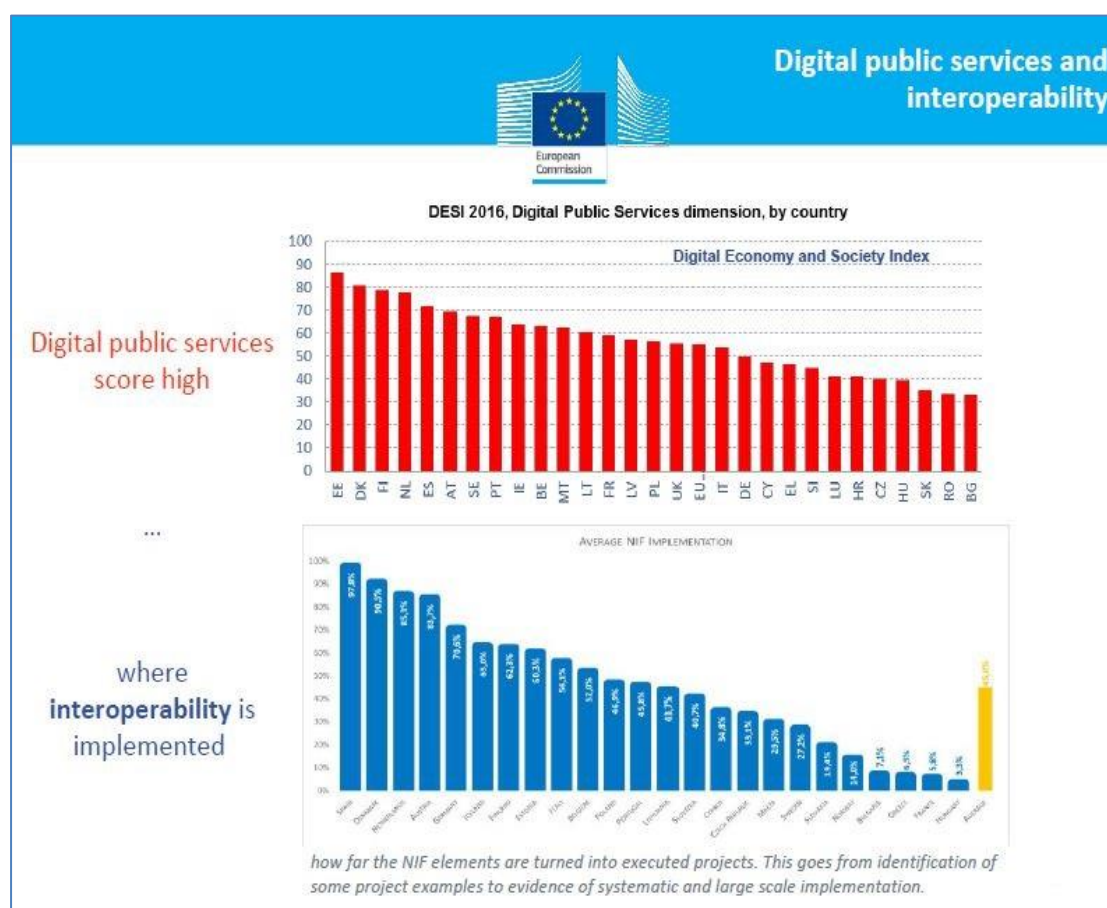


Figure 2: DESI and IOP implementation 2016 (Source: openforum)

From 2016 to 2019, the period which has the most recent DESI scores, there is an improvement according to citation [60]; Finland, Sweden, the Netherlands and Denmark scored the highest and are among the global leaders in digitalisation. They are followed by the United Kingdom (UK), Luxembourg, Ireland, Estonia and Belgium. Ireland, Lithuania, Latvia, Cyprus and Spain have made the most progress (by more than 15 points) over the last five years. Concerning the digital scores for Digital Public services, the countries' statuses have changed and some countries improved in relation to others. This year's edition shows that all Member States improved in the DESI results. Finland, Sweden, the Netherlands and Denmark, have the most advanced digital economies in the EU, followed by the UK, Luxembourg, Ireland and Estonia. Bulgaria, Romania, Greece and Poland have the lowest scores on the index. For Digital Public Services in 2016, Estonia had the highest score, followed by Denmark, Finland and the Netherlands, while Bulgaria, Romania and the Slovak Republic had the lowest scores.

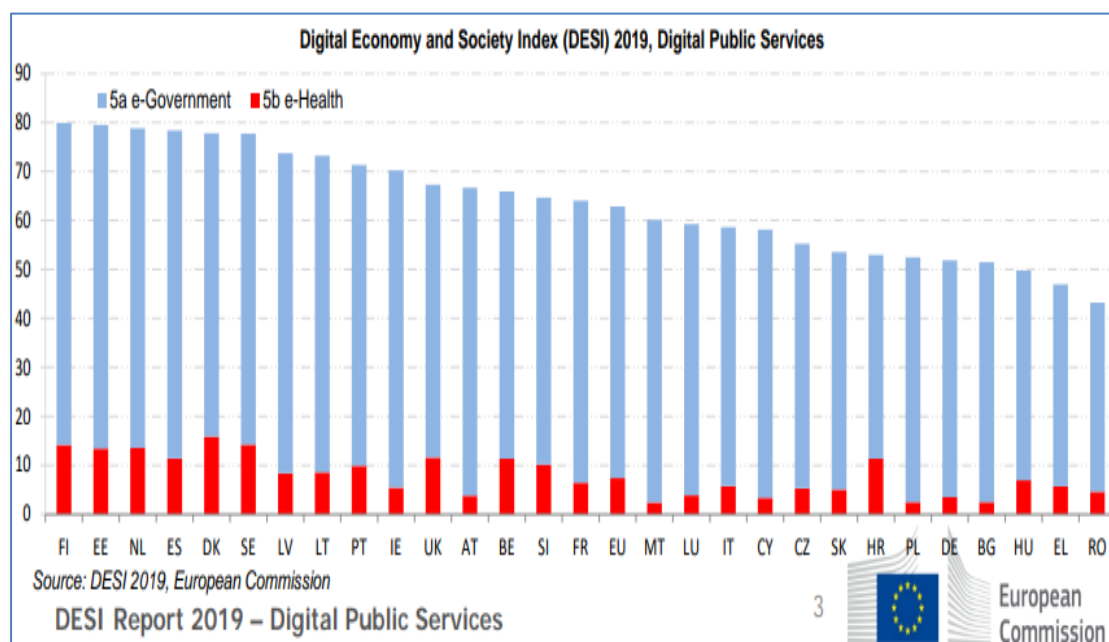


Figure 3: DESI 2019, Digital Public Services (Source: DESI)

The digital public services dimension consists of eight indicators [32]:

1. the eGovernment users measured as a percentage of those internet users who need to submit forms to the public administration (the e-government users' indicator);
2. the extent to which data that is already known to the public administration is pre-filled in forms presented to the user (the pre-filled forms indicator);
3. the extent to which the various steps in dealing with the public administration can be carried out completely online (the online service completion indicator);
4. the degree to which public services for businesses are interoperable and cross-border (the digital public services for businesses indicator);
5. the government's commitment to open data (the open data indicator);
6. the percentage of people who used online health and care services without having to go to a hospital or a doctor's office (the e-health services indicator);
7. the extent to which general practitioners are using electronic networks to exchange medical data with other healthcare providers and professionals (the medical data exchange indicator);
8. The extent to which general practitioners are using electronic networks to transfer prescriptions to pharmacists (the e-prescription indicator).

According to data from the DESI 2019 results, there is an improvement in digital public services in the last years meaning that all the measures, initiatives, and projects paved the way for this progress. In detail: *"The demand side of digital public services is progressing, as 64 % of EU citizens used public services online. The provision of government services online is progressing, with several Member States recording big improvements. The provision of digital public services for businesses is improving, having increased by more than 25 % in the last 5 years. Open data: The overall results across the EU show the variety in the speed of transformation and the priorities that countries have set. Can businesses and the public quickly and easily access public information and services? Public administrations score 84 (out of 100) points in user centricity. In the last 5 years, Member States increased the use of key enablers by 10 %. The key enabler indicators are: Electronic Identification (eID), eDocuments, base registries used by governments to automatically validate or fetch data related to individuals or businesses and Digital post. Digital health and care: more than half of the people in the EU want online access to their medical records. Almost half of general practitioners used electronic means to exchange medical data and prescribe medicines."*

2.2.1 ISA² programme

The Interoperability concept that the ISA2 programme promotes in the EC started with the launch of the CADDIA programme in 1985, continued with the IDA programme in 1995 and the IDA II in 2004, then with the IDABC programme in 2005, leading to the ISA programme in 2010, and, finally, to the current ISA2 programme which is the 5th work programme that started in 2016 (Figure 4).

The CADDIA programme (Coordinated Development of Computerized Administrative Procedures), 1985-1992, was a long-term programme (EEC) for the use of telematics for Community information systems concerned with imports and exports, and the management and financial control of agricultural market organisations. This programme was part of the Council Decision 86/23/EEC of 4.12.1986 (Official Journal No L 33 of 8.2.1986).

The IDA programme (Interchange of Data between Administrations), 1995–1999, was an implementation programme to enable Public Administrations – at the Member State and EU level – to exchange electronic data for European legislation with electronic networks and software tools. The second phase of the programme was IDA II, 1999-2004, that focused on back-office networking and central administrations (although networks to benefit citizens and businesses were also made available, such as SOLVIT).

The IDABC programme (Interoperable Delivery of European eGovernment Services to Public Administrations, Business and Citizens), 2005- 2009, had as objectives to support the delivery of cross-border public sector services to citizens and enterprises in Europe, improve efficiency and collaboration between European Public Administrations, and contribute to making Europe an attractive place to live, work and invest. Moreover, the IDABC programme financed projects and proposed recommendations, solutions and provided services for national and European administrations to communicate electronically, while at the same time offered modern public services to businesses and citizens in Europe. IDABC and the programmes that followed, ISA and ISA2, function as a multi-annual work programme that is revised at least once a year to add new Actions and indicate changes in the existing ones.

The ISA programme (collaboration beyond e-borders and sectors), 2010-2015, focused on back-office solutions that supported the interaction between European Public Administrations, and the implementation of Community policies and activities. The ISA programme had 40 Actions with a budget of EUR 160 million.

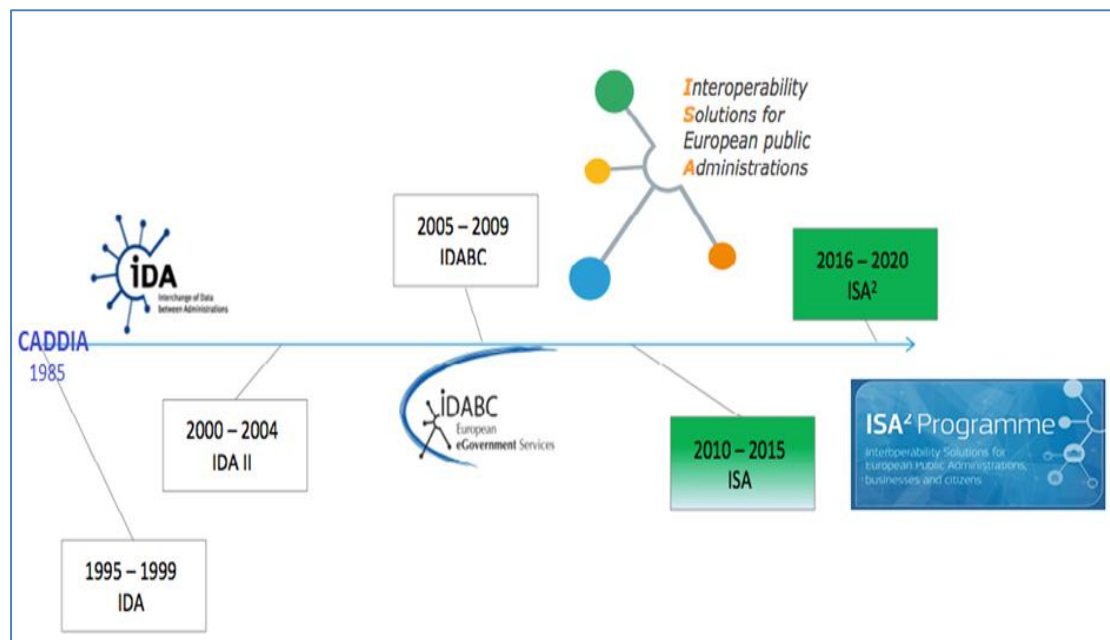


Figure 4: ISA2 evolution

The ISA² programme (Interoperability Solutions for Public Administrations, businesses and citizens), is a five-year programme and the follow-up to ISA, IDABC, IDA and IDA II. The ISA² programme has a budget of EUR 131 million, distributed among its 54 Actions over a 5-year timespan.

The ISA² programme continues the work carried out by its predecessors and also:

1. ensures that interoperability activities are well coordinated at EU level;
2. develops and operates solutions for Public Administrations on the basis of businesses' and citizens' needs;
3. puts in place the necessary instruments to boost interoperability at EU and national levels, such as EIF, EIS, EIRA and EIC.

The EC IOP policy in the EU is the Communication (COM) 2017/134 European Interoperability Strategy (EIS), which includes the European Interoperability Framework (EIF) and the Interoperability Action Plan. Those key documents promote IOP among PAs and are part of the EU Digital Agenda. EIS defines the governance, strategy, framework and principles while the IOP Action Plan defines the implementation timeframe. EIF is an action supported and monitored by the ISA² programme (2016-2020), and the context of IOP is aligned with the Connecting Europe Facility (CEF) [61] programme. As referred to in the DSM [41], the CEF programme supports the deployment and the operation of key cross-border services as a funding instrument. Also, H2020 [62] is another financial instrument that aids research and innovation. In this field, it is important to refer to the previously mentioned CIP ICT-PSP [63] programme that supported along – with ISA – several policy areas for Large Scale Projects (LSP) to improve IOP in delivering European public services.

The ISA² programme is managed by the Interoperability Unit of the EC, DG DIGIT¹⁰. Among the responsibilities of this Directorate is to promote and facilitate interoperability for European Public Administrations, and this is the scope of the Unit within this programme. The programme supports Actions and offers free digital solutions (frameworks, tools, and services) that enable PAs, businesses and citizens in Europe to benefit from interoperable cross-border and cross-sector public services.

2.2.1.1 ISA² solutions

The ISA² programme has already 28¹¹ IOP open source solutions developed under 54 actions of this programme and is predecessor. According to the ISA² work programme 2020 summary [64].¹² Amongst those actions there are several available free solutions [65] offered by the ISA² programme that can assist Administrations in achieving interoperability.

The actions are categorised into the following 9 areas:

1. Key and generic interoperability enablers (7 actions)

- 1) Access to base registers (2016.28);
- 2) Catalogue of services (2016.29);
- 3) Data Communication network service (TESTA / TESTA NG) (2016.02);
- 4) IPV6 Framework for European governments (2016.09);
- 5) eTrustex - Trusted Exchange Platform (2016.19);
- 6) Electronic Documents and Electronic Files: Interoperability Agreements and Form Generators (2016.26);
- 7) Innovative Public Services (2018.01).

2. Semantic interoperability (4 actions)

- 1) SEMIC: promoting semantic interoperability amongst the European Union member states (2016.07);

¹⁰ European Commission, 2019, DG DIGIT, Responsibilities: https://ec.europa.eu/info/departments/informatics_en#leadership

¹¹ ISA² solutions: https://ec.europa.eu/isa2/solutions_en

¹² The European Commission has adopted the 2020 revision of the ISA² rolling work programme on 4 March 2020 therefore this thesis was adopted to update the previous text for the ISA² WP 2019.

- 2) Semantic interoperability for representation powers and mandates (2016.12);
- 3) Public multilingual knowledge management infrastructure for the Digital Single Market (2016.16);
- 4) Interoperable Meta Data and Processing Components for Open Source Information Mining (2018.02).
- 3. Access to data / data sharing / open data (7 actions)**
 - 1) Sharing statistical production and dissemination services and solutions in the European statistical system (2016.06);
 - 2) Financial Data standardisation (2016.15);
 - 3) Development of an open data service, support and training package in the area of linked open data, data visualisation and persistent identification (2016.18)
 - 4) Automatic Business Reporting (2016.11);
 - 5) Big data for public administrations (2016.03);
 - 6) Improving Statistical Data and Metadata Discoverability and Analysis (2018.03);
 - 7) COMPARED - Text mining solution to support the evaluation process of research grant applications (2018.07).
- 4. Geospatial solutions (1 action)**
 - 1) ELISE - European location interoperability solutions for eGovernment (2016.10).
- 5. eProcurement / eInvoicing (1 action)**
 - 1) European Public procurement interoperability initiative (2016.05).
- 6. Decision-making and legislation (10 actions)**
 - 1) Participatory knowledge for supporting decision making (2016.04);
 - 2) Legislation interoperability tools (2016.38);
 - 3) Legal Interoperability (ex- ICT implications of EU legislation) (2016.23)
 - 4) European Legislation Identifier (2016.08);
 - 5) THEMIS - Application of EU law: provision of cross sector communication and problem solving tools (2016.01);
 - 6) Interinstitutional framework for digital OLP management (2016.17);
 - 7) ELI@EULAW (2017.02);
 - 8) RefIT Platform (2017.03);
 - 9) Inter-Institutional Register of Delegated Acts (2017.04);
 - 10) Future Comitology Register (2018.04).
- 7. EU policies (5 actions)**
 - 1) CISE - development of the information sharing environment for the surveillance of the EU maritime domain (2016.13);
 - 2) European Citizens' Initiatives and European Elections (2016.14);
 - 3) ABCDE - Administration, Business and Citizens' Data Exchanges in the domain of Case Management (2016.24);
 - 4) Electronic access to EC documents (2018.05);
 - 5) Interoperability requirements for the Single Digital Gateway implementation (2017.05).
- 8. Supporting instruments for public administrations (17 actions)**
 - 1) European interoperability Architecture (EIA) (2016.32);
 - 2) IMAPS (ex Interoperability maturity Model) (2016.37);
 - 3) National Interoperability Framework Observatory (2016.21); The NIFO was established in 2009 for the monitoring of the implementation of national IOP frameworks and for the assessment of the compatibility with the EIF. It provides information about NIFs to allow PAs to share experiences and knowledge and an analytical model and gap analysis tool and is currently aligned (and the MS' factsheets) with EIF2. The EIF is part of NIFO and provides guidance to PAs with a set of common principles, models and

recommendations and is the basis for the majority of the national IOP frameworks (NIFs) and strategies.

- 4) CAMSS - Common assessment method for standards and specifications (2016.27);
- 5) EIF Implementation and Governance models (2016.33);
- 6) Circabc (2016.34);
- 7) EUSurvey (2016.35);
- 8) Interoperability testbed (2016.25);
- 9) Joinup - European collaborative platform and catalogue (2016.20);
- 10) Community building and effective use of collaborative platforms (2016.22)
- 11) Assessment of trans-European systems (TES) supporting EU policies (2016.36);
- 12) Sharing and re-use (2016.31);
- 13) Standard-based archival data management, exchange and publication (2017.01);
- 14) FAIR Data Maturity Model (2018.06);
- 15) EU Captcha (2018.08);
- 16) GOVSEC - platform for inter-Institutional Security governance (2018.09);
- 17) Interoperability Academy (2019.01).

9. Accompanying measures (2 actions)

- 1) Raising interoperability awareness - communication activities (2016.30);
- 2) Monitoring and evaluation (2016.39).

2.2.1.1.1 ISA² solutions in focus for eGIF

In the purpose of this thesis, the following solutions were selected to be described further as they are considered to provide important feedback for the proposals of the new generation eGIF. The EIF and the NIFO observatory will be examined in the following chapters.

1. **Joinup**¹³ platform that shares and reuses IT solutions developed for PAs with more than 2800 IOP solutions; Joinup is the place to go when looking for interoperability solutions. By federating solutions with Joinup, external repositories instantly expand their user-base and expose their interoperability solutions to others. The main functions of joinup are three:
 - Sharing of information, by publishing news, case studies and listing relevant events;
 - Cataloguing re-usable interoperability solutions such as software, taxonomies, vocabularies, code-lists, licences, organisational assets and guidelines;
 - Allowing public administrations, businesses and citizens to collaborate with each other on development projects.
2. **EIRA European IOP Reference Architecture (EIRA©)**¹⁴ and the **European Interoperability Cartography (EICart)** are solutions that define guidelines and specifications for IOP by classifying and organising building blocks (BBs); EIRA documents digital solutions, identifies possibilities for reusing them, classifies and organises building blocks relevant to interoperability. Moreover, provides a common language of architecture building blocks for the design and comparison of the solution architectures of e-Government solutions and common interoperability specifications which is a basis for stable interfaces between digital public services. The EIRA© is a four-view reference architecture for delivering interoperable digital public services across borders and sectors. It defines the required capabilities for promoting

¹³ Joinup: <https://joinup.ec.europa.eu/>

¹⁴EIRA, <https://joinup.ec.europa.eu/collection/european-interoperability-reference-architecture-eira>

interoperability as a set of architecture building blocks (ABBs). The EIRA© has four main characteristics: Common terminology to achieve a minimum level of coordination, Reference architecture for delivering digital public services, Technology- and product-neutral and a service-oriented architecture (SOA) style, Alignment with EIF and TOGAF®. The Cartography Tool (CarTool©) supports EIRA© Cartography Tool as a plug-in for the ArchiMate® modelling tool Archi®. This tools can help in: ICT solution development, New legislative proposals, Public procurement and Portfolio management.

3. **Common Assessment Method for Standards and Specifications (CAMSS)**¹⁵ is a common assessment method for standards and specifications, Interoperability Test Bed an IOP and conformance testing platform; CAMSSS is fully aligned with the European Standardisation Regulation 1025/2012.
4. **Asset Description Metadata Schema (ADMS)-AP**¹⁶ for semantic IOP that reuse metadata and reference data semantic assets; the version 2.0 of the ADMS-AP is the latest version. The ADMS is a specification to describe semantic interoperability solutions this application profile of ADMS extends the use of ADMS for the description of other types of interoperability solutions, meaning solutions covering the political, legal, organisational and technical interoperability layers defined by the European Interoperability Framework.
5. **DCAT Application Profile for data portals**¹⁷ in Europe a specification for the description of public sector datasets; The DCAT Application Profile for data portals in Europe (DCAT-AP) is a specification based on the Data Catalogue Vocabulary (DCAT) developed by W3C. DCAT-AP is a specification for metadata records for the data portals. The specification provides further semantic interoperability with other applications such as EuroVoc and mappings to existing metadata vocabularies (e.g. Dublin Core, SDMX, INSPIRE metadata, etc.). In addition provides a common specification for describing public sector datasets in Europe to enable the exchange of descriptions of datasets among data portals
6. **Core Vocabularies** Simplified for reusable and extensible data models;
7. **Common Public Service Vocabulary Application Profile (CPSV-AP)** A data model for describing public services and the associated life and business events;
8. **e-Documents Reference Architecture** with ArchiMate diagrams visualising e-Document lifecycle;
9. **European Single Procurement Document (ESPD)** a tool facilitating participation in public procurement across the EU;
10. **Open e-Prior** an e-Procurement system for PAs;
11. **e-Certis** a tool for mapping certificates necessary in public procurement;
12. **Open e-TrustEx** a secure document exchange platform;
13. **European Union Public Licence (EUPL)** for Open source licences;
14. **Re3gistry** a tool to manage and share reference codes;
15. **LEOS**¹⁸ a tool facilitating the editing of legislative texts. This tool can help all those that draft legislation, which is a complex process requiring efficient online collaboration. Leos is an open source tool with a growing community. The tool gives the possibility to comment, suggest, co – edit, also the content is stored in an XML format. Moreover, supports the drafting of the 'secondary' legislation of the EU law, which has to be adopted under the Ordinary Legislative Procedure thus the writing of

¹⁵ CAMMS: <https://joinup.ec.europa.eu/collection/common-assessment-method-standards-and-specifications-camss/about>

¹⁶ ADMS: <https://joinup.ec.europa.eu/solution/asset-description-metadata-schema-adms/distribution/adms-ap-version-201-docx>

¹⁷ DCAT- AP, <https://joinup.ec.europa.eu/solution/dcat-application-profile-data-portals-europe>

¹⁸ LEOS, <https://joinup.ec.europa.eu/solution/leos-open-source-software-editing-legislation/about>

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Proposals for Directive, Decision and Regulation submitted by the Commission to the Council and the Parliament. LEOS has the following principles:

- Principle 1. Governance based on utility and driven by identified needs and programme objectives
 - Principle 2. Consensus driven but decision oriented, proportionate stakeholder representation organisational structure
 - Principle 3. The design of reusable building blocks delivered by the actions support the implementation of user-centricity principles for design
 - Principle 4. Inclusive organisational structure and governance process supporting accessibility
 - Principle 5. Use of open standards and specifications
 - Principle 6. Governance process ensuring transparency
 - Principle 7. Governance ensuring re-usability and avoidance of duplication
 - Principle 8. Governance process ensuring flexibility and extensibility
 - Principle 9. Governance process supporting sustainability
16. **TESTA** a data communication network service;
 17. **VocBench3** a multilingual platform for collaborative thesaurus management;
 18. **OpenPM²** a methodology for Open Project Management;
 19. **EUSurvey** a tool for creating, managing and analysing online surveys and public consultations;
 20. **OCS for ECIs** is an online collection software that supports European Citizens' Initiatives;
 21. **CIRCABC** the Communication and Information Resource Centre for Administrations, Businesses and Citizens;
 22. **IMAPS** (former IMM) Interoperability Maturity Model is an online tool that can help PAs check IOP readiness of their services. It has been used by 17 Trans European Systems to assess the interoperability maturity of their public services and by 2 MS to check a number of public services;

2.2.2 European Interoperability Framework (EIF)

EIF is not a directive but a communication that is a point of reference for countries in Europe and beyond. It forms the basis for most National Interoperability Frameworks and/or Interoperability Strategies. EIF is a commonly agreed approach to the delivery of European public services; MSs should enforce a global approach to reach the required level of IOP with the help of EIF, for common standards and requirements. [31] [20]. The European Interoperability Framework (EIF) [25], is part of Communication (COM (2017)134) of the European Commission adopted on 23 March 2017 and it gives specific guidance on how to set up interoperable digital public services. EIF is an Action supported and monitored by the ISA² programme (2016–2020)¹⁹. It consists of a strategy and an Action Plan. The strategy defines the governance, strategy, framework and principles, while the Action Plan defines the implementation period. An important instrument is the National Interoperability Framework Observatory (NIFO)²⁰ which is an Action for monitoring the implementation of National IOP Frameworks and assessment of their compatibility with EIF (EIF v2). EIF provides guidance to Public Administrations with a set of common principles, models and recommendations and is the basis for the majority of the National IOP Frameworks (NIFs) and strategies. There are three versions of EIF: The first EIF version of 2004 (European IOP Framework for pan-European eGovernment Services), the 2010 version of EIF v2 (Towards IOP for European public services), and the 2017 version which is the current EIF (Promoting seamless services and data flows for European public administrations). The new Framework puts more emphasis on how interoperability principles and models should apply in practice, and the number of recommendations has increased from 25 to 47. EIF was updated accordingly for data openness and portability, integrated services delivery, open standards and specifications.

As technology advances very fast, it becomes obvious that the need to apply such technological changes in public services is paramount in order to lead to growth in societies [66]. Under this aspect, emphasis should be given also to the regular updating not only of the National Interoperability Frameworks, but also to EIF itself due to the rapid changes and the actual implementation of the recommendations it presents. The fact that the updates between EIFs took several years, and that still there are MSs that currently have an outdated version of NIF – which in some cases reaches back to EIF v1 – shows that the actual implementation has fallen behind, thus there is an urgent need to address this issue at the European level with the close collaboration of MSs [1].

2.2.3 EIF evolution – Version 1 (2004)

The first version of EIF was under the IDABC programme and was described as not to be a static document that had to be updated over time as technologies, standards and administrative requirements changed. The organisational, semantic and technical aspects were recognised to have a common agreement to facilitate IOP eGov services among PAs. EIF v1 was supported by the IDABC Architecture Guidelines [67] for the establishment of IDA TESTA, CIRCA and PKI services, and for users to interoperate with IDA and IDABC networks. EIF v1 has three chapters, the first chapter introduced basic information and the underlying principles, the second the basics of the framework – with the basic interaction and the three key areas (organisational, semantic, technical) –, and the third chapter provided more recommendations for NIFs, high-level state's policy issues, the business requirements for eGov services and

¹⁹ISA² (2016–2020) programme: https://ec.europa.eu/isa2/isa2_en

²⁰NIFO-National Interoperability Framework Observatory: Analytical models: <https://joinup.ec.europa.eu/collection/national-interoperability-framework-observatory-nifo/nifo-analytical-models>

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recommendations for a general approach. In detail it has 8 general principles: Accessibility, Multilingualism, Security, Privacy, Subsidiarity, Use of Open Standards, Assessing the benefits of Open Source Software, Use of Multilateral Solutions, and 17 recommendations accompanied by several general recommendations for NIFs (effectiveness, efficiency, flexibility, transparency, business requirements for eGov services, and several general approaches such as open standards). The structure of the main aspects, its actors and working context, the framework with the aspects, the stakeholders for development and maintenance, the policies and the target groups as shown in Figure 5. Emphasis is given on the interactions between PAs and the fact that EIF acts as a suggestion and guidance for NIFs or strategies for eGov services for cross-border transactions. Although, there are fewer recommendations and principles in relation to the next EIF versions, most of the issues, policies or approaches stated here are elaborated further in the next versions – for instance the reuse of standards or transparency of services.

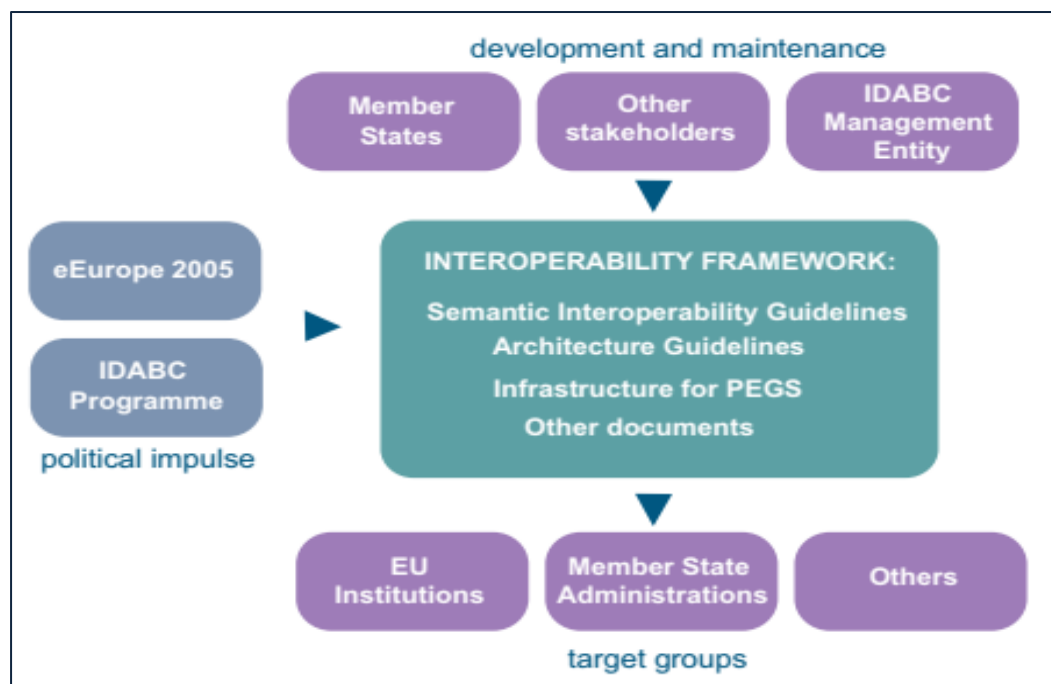


Figure 5: The structure of EIF v1 (Source: EIF p. 11, fig. 2)

2.2.4 EIF evolution – Version 2 (2010)

The updated EIF v2, COM/2010/744 [23] along with the European Interoperability Strategy (EIS), are two key documents that aim to promote IOP among PAs that are part of the DSM. EIS briefly states the status on IOP, the EC initiatives, the achievements made, the sectoral initiatives, the challenges and the identified problems, and proposes specific actions for the EC and MSs in order to achieve IOP and align and implement EIS and EIF with support activities (Trusted Information Exchange, IOP Architecture, and Assessment of the ICT implications of new EU legislation).

The work of the revision of EIF started in IDABC programme to update the recommendations amongst procedures and systems (Figure 6).

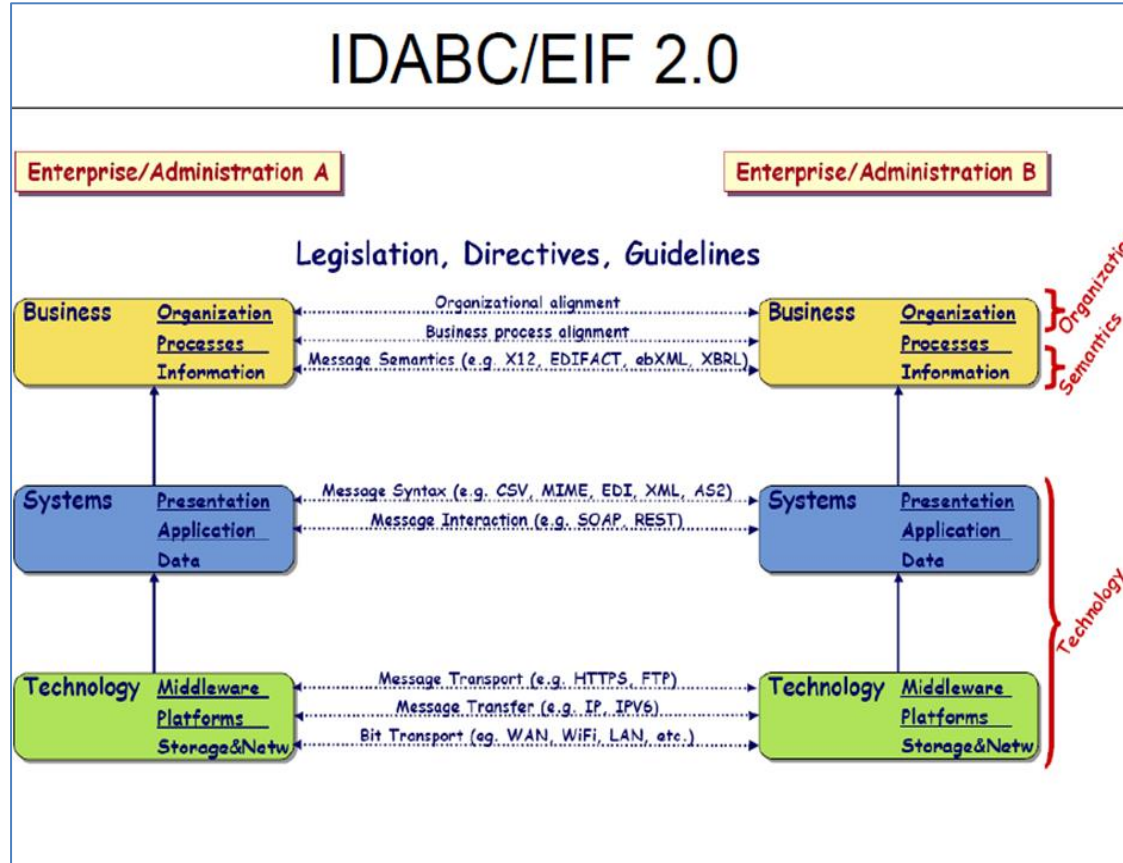


Figure 6: EIF revision IDABC (image extracted from IDABC)

This version includes a set of common elements such as vocabulary, concepts, principles, policies, guidelines, recommendations, standards, specifications and practices for organisations that wish to work together towards the joint delivery of public services within the EU and across Member State borders. It specifies IOP layers of interoperability such as political context, legal, semantic and technical interoperability. EIF v2 has seven chapters, the first chapter gives an introduction of the basic terms and scenarios, the second presents the principles, the third describes the conceptual model for public services, the fourth shows the IOP levels with its layers, the fifth presents the interoperability agreements, the sixth describes the IOP governance as a whole, and the last chapter contains abbreviations and the glossary.

The Framework has 25 recommendations and 12 principles, one conceptual model for public services (as shown in Figure 7), and four IOP layers for the practical implementation of the conceptual model for cross-border/cross-sectoral services. The term “conceptual model” is presented which, in relation to EIF v1, is more detailed in describing the target groups / stakeholders which are included as users, the policy impulses as prerequisites in the Framework, and in the IOP layers the inclusion of a horizontal layer as the political layer. The

model suggests an overall organising principle (common scheme) for designing and establishing European public services, focusing on basic services (base registries, interoperability facilitators, and external services) which can form aggregated services. The IOP layers address the IOP aspects when designing a European public service and provide a common vocabulary: the IOP agreements, the approach for cooperation among PAs for a European public service with the interoperability agreements, the formalised specifications and the open specifications. The IOP governance gives guidance for establishing, ensuring and sustaining IOP for European public services across administrative levels.

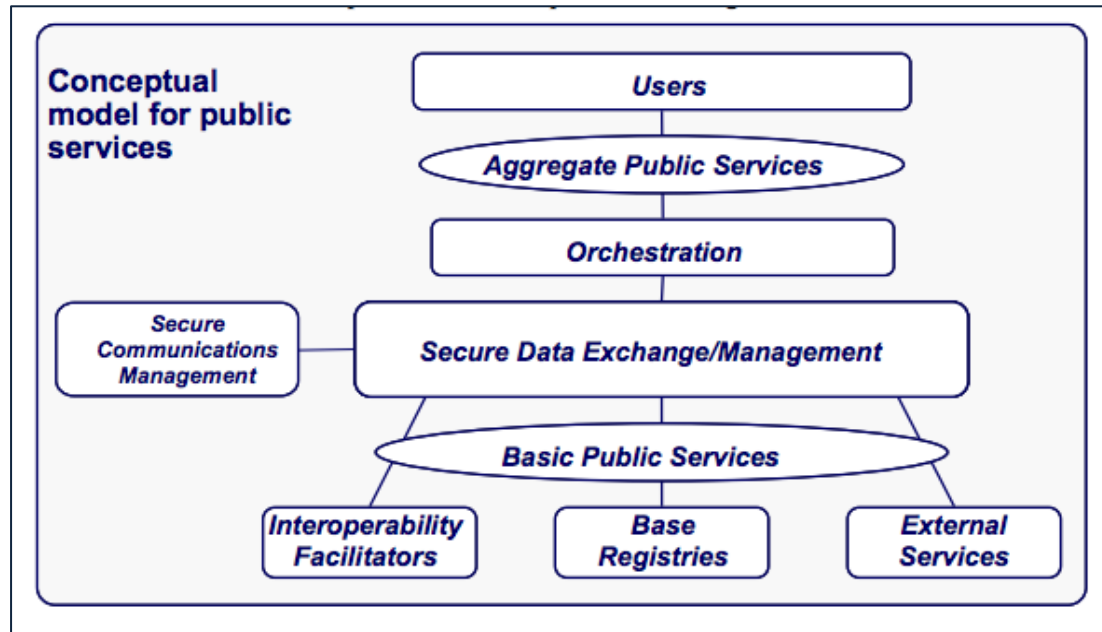


Figure 7: The conceptual model of EIF v2, (Source: EIF v2 p. 14, fig. 3.1)

2.2.5 EIF evolution – Version 3 (2017)

The DSM was an important aspect for updating and extending EIF v2, since EIF was included in the initiative to be implemented in 2015 (Figure 8).

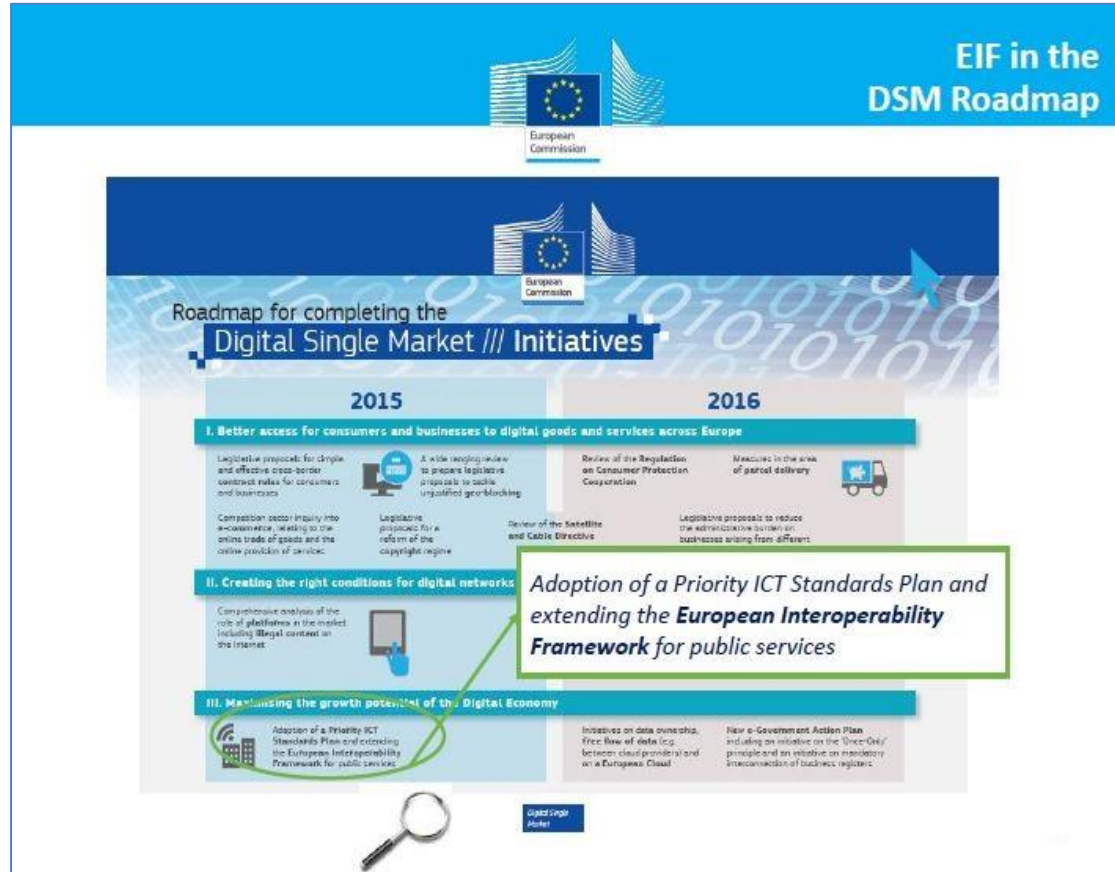


Figure 8: EIF v2 in DSM (Source: openforum)

The current version of EIF is v3 and is part of the EU COM/2017/134 [24]. This version has taken into account the lessons learned by implementing EIF v2, the recent technological trends, the new information exchange requirements, and the recent EU policies, directives, political initiatives and the view of relevant stakeholders after a public consultation [68]. It has as an implementation strategy the European Interoperability Strategy (EIS), and is supported by the Interoperability Action Plan with the priorities for its implementation until 2020, and NIFO as a tool for alignment and monitoring with MS NIFs within the proposed timeframe (2016-2020). EIS is a systematic approach to govern IOP at EU level with specific goals, and provides the organisational and financial framework to achieve them by implementing interoperability. In brief, EIS states the status on IOP, EC initiatives, financial instruments and will focus on five areas: 1) Ensuring governance, coordination and sharing of interoperability initiatives, 2) Developing organisational interoperability solutions, 3) Engaging stakeholders and raising awareness on interoperability, 4) Developing, maintaining and promoting key interoperability enablers, and 5) Developing, maintaining and promoting instruments that support interoperability. EIS's main drivers are political, legal, economic, technological and social and have two approaches: the top-down (or global) approach, and the bottom-up (or sectoral) approach.

The Interoperability Action Plan proposes 22 actions to be implemented accordingly to each of the focus areas by 2020, with the responsibility of the EC and MSs. The EC – supported by the ISA² programme – will govern and coordinate the implementation and monitoring.

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In this version, focus is given to the actual application of principles and models that should be applied in practice with more specific recommendations to facilitate their implementation (Figure 9), and with emphasis on openness and information management, data portability, IOP governance, and integrated service delivery. Furthermore, EIF provides the schema and core components for interoperability elements to NIFs and Domain Interoperability Frameworks (DIFs), in order for them to be aligned and coordinated in a common way.

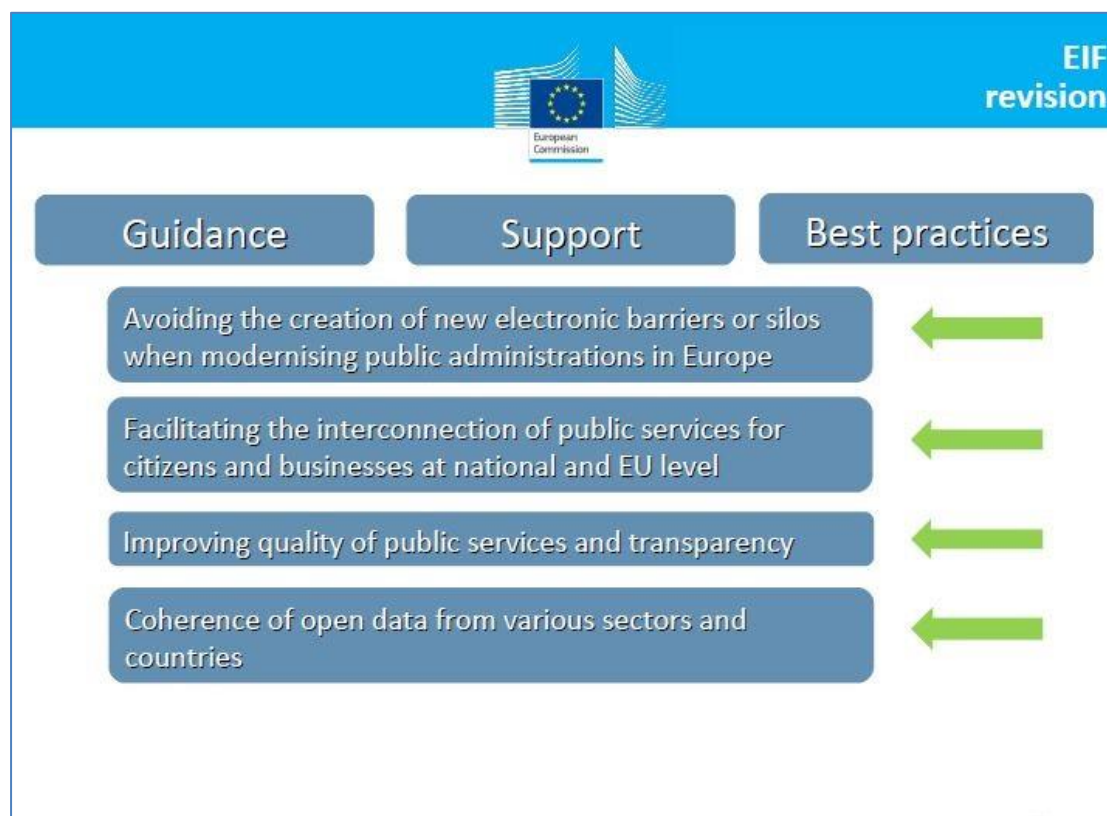


Figure 9: EIF revision – Main pillars (Source: openforum)

2.2.5.1 EIF Architecture

The New EIF has 47 recommendations for the basic elements of the principles, the model and the layers. The elements as shown in figure 10 are: the conceptual model for integrated public services with the standard approach of "IOP-by-design", the horizontal IOP governance with four levels of interoperability for the implementation of European public services, the integrated public service governance, and twelve fundamental IOP principles for interoperability.

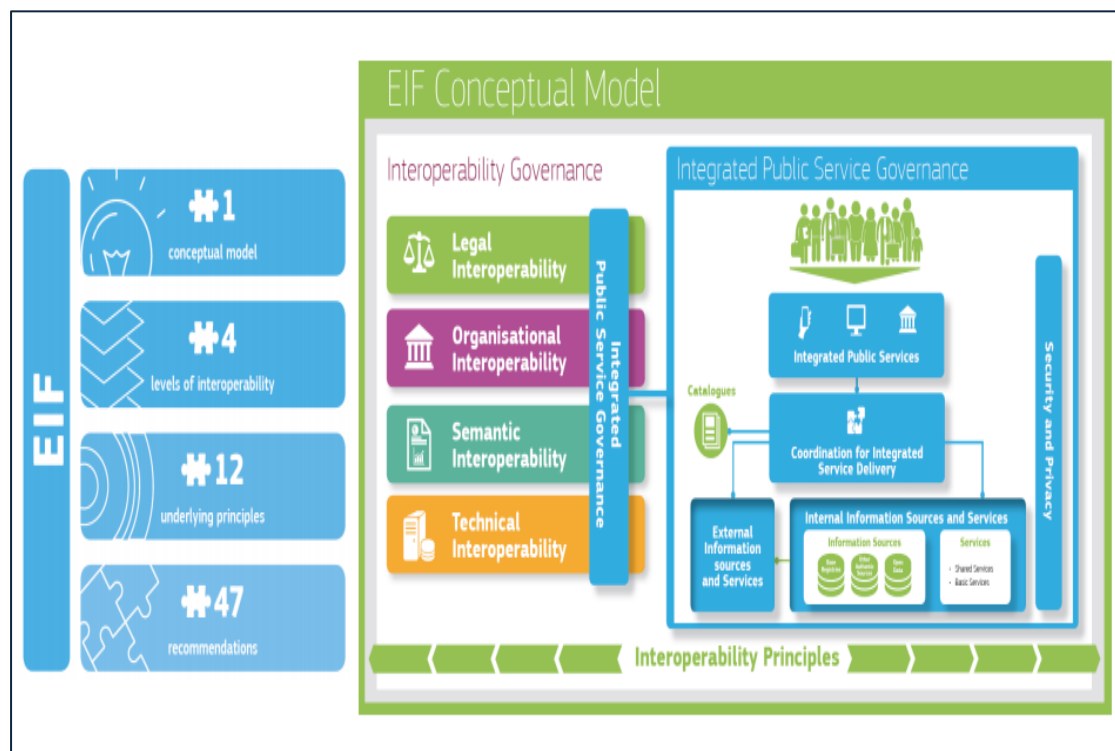


Figure 10: The basic elements of EIF v3 (Source: EIF brochure)²¹

In addition, EIF v3 has three elements for each of which recommendations are provided. The four (4) categories and the twelve (12) principles (P) with the forty seven (47) Recommendations (R), the six (6) interoperability layers and the conceptual model.

1. The four categories (C) have twelve (12) principles (P):
 - I. C1. Principle setting the context for EU actions on interoperability Principle (no R);
 - II. (P) P1. Subsidiarity and proportionality with one recommendation (1R);
 - III. C2. Core interoperability principles for four (P): P2. Openness (3R), P3. Transparency (1R), P4. Reusability (2R), P5. Technological neutrality and data portability (2R);
 - IV. C3. Principles related to generic user needs and expectations for four (P): P6. User-centricity (4R), P7. Inclusion and accessibility (1R), P8. Security and privacy (1R), P9. Multilingualism (1R);
 - V. C4. Foundation principles for cooperation among Public Administrations for three (P): P10. Administrative simplification (1R), P11. Preservation of information (1R), P12. Assessment of Effectiveness and Efficiency (1R).
2. The interoperability layers (L) with 14 (R): the horizontal interoperability governance with (5R), the integrated public service governance (2R), the legal interoperability (1R), the organisational (2R), the semantic (3R) and technical IOP (1R);
3. The conceptual model for integrated services provision with 14 (R): the Conceptual model for integrated public services (2R), the Internal information sources and services (1R), the Base registries (4R), the Open data (3R), the Catalogues (1R), the External information sources and services (1R), the Security and privacy (2R).

The forty-seven (47) Recommendations (R) categorised accordingly below:

I. Principles:

²¹ European Commission, ISA², EIF Brochure : https://ec.europa.eu/isa2/sites/isa/files/eif_brochure_final.pdf

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1. Principle 1: Subsidiarity and proportionality
Recommendation 1: Ensure that national interoperability frameworks and interoperability strategies are aligned with EIF and, if needed, tailor and extend them to address the national context and needs.
2. Principle 2: Openness
Recommendation 2: Publish the data you own as open data unless certain restrictions apply.
Recommendation 3: Ensure a level playing field for open source software and demonstrate active and fair consideration of using open source software, taking into account the total cost of ownership of the solution.
Recommendation 4: Give preference to open specifications, taking due account of the coverage of functional needs, maturity and market support and innovation.
3. Principle 3: Transparency
Recommendation 5: Ensure internal visibility and provide external interfaces for European public services.
4. Principle 4: Reusability
Recommendation 6: Reuse and share solutions, and cooperate in the development of joint solutions when implementing European public services.
Recommendation 7: Reuse and share information and data when implementing European public services, unless certain privacy or confidentiality restrictions apply.
5. Principle 5: Technological neutrality and data portability
Recommendation 8: Do not impose any technological solutions on citizens, businesses and other administrations that are technology-specific or disproportionate to their real needs.
Recommendation 9: Ensure data portability, namely that data is easily transferable between systems and applications supporting the implementation and evolution of European public services without unjustified restrictions, if legally possible.
6. Principle 6: User-centricity
Recommendation 10: Use multiple channels to provide the European public service, to ensure that users can select the channel that best suits their needs.
Recommendation 11: Provide a single point of contact in order to hide internal administrative complexity and facilitate users' access to European public services.
Recommendation 12: Put in place mechanisms to involve users in analysis, design, assessment and further development of European public services.
Recommendation 13: As far as possible under the legislation in force, ask users of European public services once-only and relevant-only information.
7. Principle 7: Inclusion and accessibility
Recommendation 14: Ensure that all European public services are accessible to all citizens, including persons with disabilities, the elderly and other disadvantaged groups. For digital public services, Public Administrations should comply with e-accessibility specifications that are widely recognised at European or international level.
8. Principle 8: Security and privacy
Recommendation 15: Define a common security and privacy framework and establish processes for public services to ensure secure and trustworthy data exchange between public administrations and in interactions with citizens and businesses.
9. Principle 9: Multilingualism
Recommendation 16: Use information systems and technical architectures that cater for multilingualism when establishing a European public service. Decide on the level of multilingualism support based on the needs of the expected users.
10. Principle 10: Administrative simplification
Recommendation 17: Simplify processes and use digital channels whenever appropriate for the delivery of European public services, to respond promptly and with

high quality to users' requests and reduce the administrative burden on public administrations, businesses and citizens.

11. Principle 11: Preservation of information

Recommendation 18: Formulate a long-term preservation policy for information related to European public services and especially for information that is exchanged across borders.

12. Principle 12: Assessment of effectiveness and efficiency

Recommendation 19: Evaluate the effectiveness and efficiency of different interoperability solutions and technological options considering user needs, proportionality and balance between costs and benefits.

II. Interoperability layers

1. Interoperability governance

Recommendation 20: Ensure holistic governance of interoperability

Recommendation 21: Put in place processes to select relevant standards and specifications, evaluate them, monitor their implementation, check compliance and test their interoperability.

Recommendation 22: Use a structured, transparent, objective and common approach to assessing and selecting standards and specifications. Take into account relevant EU recommendations and seek to make the approach consistent across borders. Recommendation 23: Consult relevant catalogues of standards, specifications and guidelines at national and EU level, in accordance with your NIF and relevant DIFs, when procuring and developing ICT solutions.

Recommendation 24: Actively participate in standardisation work relevant to your needs to ensure your requirements are met.

2. Integrated public service governance

Recommendation 25: Ensure interoperability and coordination over time when operating and delivering integrated public services by putting in place the necessary governance structure.

Recommendation 26: Establish interoperability agreements in all layers, complemented by operational agreements and change management procedures.

3. Legal interoperability

Recommendation 27: Ensure that legislation is screened by means of 'interoperability checks', to identify any barriers to interoperability. When drafting legislation to establish a European public service, seek to make it consistent with relevant legislation, perform a 'digital check' and consider data protection requirements.

4. Organisational interoperability

Recommendation 28: Document your business processes using commonly accepted modelling techniques and agree on how these processes should be aligned to deliver a European public service.

Recommendation 29: Clarify and formalise your organisational relationships for establishing and operating European public services.

5. Semantic interoperability

Recommendation 30: Perceive data and information as a public asset that should be appropriately generated, collected, managed, shared, protected and preserved.

Recommendation 31: Put in place an information management strategy at the highest possible level to avoid fragmentation and duplication. Management of metadata, master data and reference data should be prioritised.

Recommendation 32: Support the establishment of sector-specific and cross-sectoral communities that aim to create open information specifications and encourage relevant communities to share their results on national and European platforms.

6. Technical interoperability

Recommendation 33: Use open specifications, where available, to ensure technical interoperability when establishing European public services.

III. The conceptual model for integrated public services provision

1. Conceptual model

Recommendation 34: Use the conceptual model for European public services to design new services or reengineer existing ones and reuse, whenever possible, existing service and data components.

Recommendation 35: Decide on a common scheme for interconnecting loosely coupled service components and put in place and maintain the necessary infrastructure for establishing and maintaining European public services.

2. Internal information sources and services

Recommendation 36: Develop a shared infrastructure of reusable services and information sources that can be used by all Public Administrations.

3. Base registries

Recommendation 37: Make authoritative sources of information available to others while implementing access and control mechanisms to ensure security and privacy in accordance with the relevant legislation.

Recommendation 38: Develop interfaces with base registries and authoritative sources of information, publish the semantic and technical means and documentation needed for others to connect and reuse available information.

Recommendation 39: Match each base registry with appropriate metadata including the description of its content, service assurance and responsibilities, the type of master data it keeps, conditions of access and the relevant licences, terminology, a glossary, and information about any master data it uses from other base registries.

Recommendation 40: Create and follow data quality assurance plans for base registries and related master data.

4. Open data

Recommendation 41: Establish procedures and processes to integrate the opening of data in your common business processes, working routines, and in the development of new information systems.

Recommendation 42: Publish open data in machine-readable, non-proprietary formats. Ensure that open data is accompanied by high quality, machine-readable metadata in non-proprietary formats, including a description of their content, the way data is collected and its level of quality and the licence terms under which it is made available. The use of common vocabularies for expressing metadata is recommended.

Recommendation 43: Communicate clearly the right to access and reuse open data. The legal regimes for facilitating access and reuse, such as licences, should be standardised as much as possible.

5. Catalogues

Recommendation 44: Put in place catalogues of public services, public data, and interoperability solutions and use common models for describing them.

6. External information sources and services

Recommendation 45: Where useful and feasible to do so, use external information sources and services while developing European public services.

7. Security and Privacy

Recommendation 46: Consider the specific security and privacy requirements and identify measures for the provision of each public service according to risk management plans. Recommendation 47: Use trust services according to the Regulation on eID and Trust Services as mechanisms that ensure secure and protected data exchange in public services.

2.2.6 EIF and NIFs

EIF operates at a higher level of abstraction and although it does not impose choices or obligations on the MS according to its subsidiarity principle, still it is considered a valuable guide towards interoperability. NIFs are more detailed and often more prescriptive than EIF. In the reports for IOP in Europe [69] for the EIF- NIF alignment, full alignment is still not reached and a need for more guidance is stated. Accordingly, EIF harmonisation with the NIFs in 2016 was 75% percent, in 2015 72 %, in 2014 72 % and in 2013 37% full alignment, 37% partial and 26% not aligned. The NIFO Action has the NIFO Analytical Model for several European Countries. The three pillars of the model for the measurement of IOP frameworks are: the alignment, the implementation and the monitoring. The information is collected from data that were provided by the participating countries according to the readiness of their services. In the 2016 reports, 26 countries participated for the alignment and implementation with EIF v2, but only 22 on the monitoring. As stated in citations [70] and [71], the IOP reports show that the EIF and NIF alignment is increasing each year (2013-2016), thus moving a step closer to IOP. For non-European countries, in the extent of this research, no association to a similar method was found and, instead, the NIFO Analytical model for comparison was used (although a revision is needed to comply with the New EIF and its methods of measurement of provided information). In the most recent ISA² documents, referring to the alignment, and in specific in a presentation from 2017, (Figure 11) is stated that there an alignment in EIF and NIFs in comparison to the previous years [72].

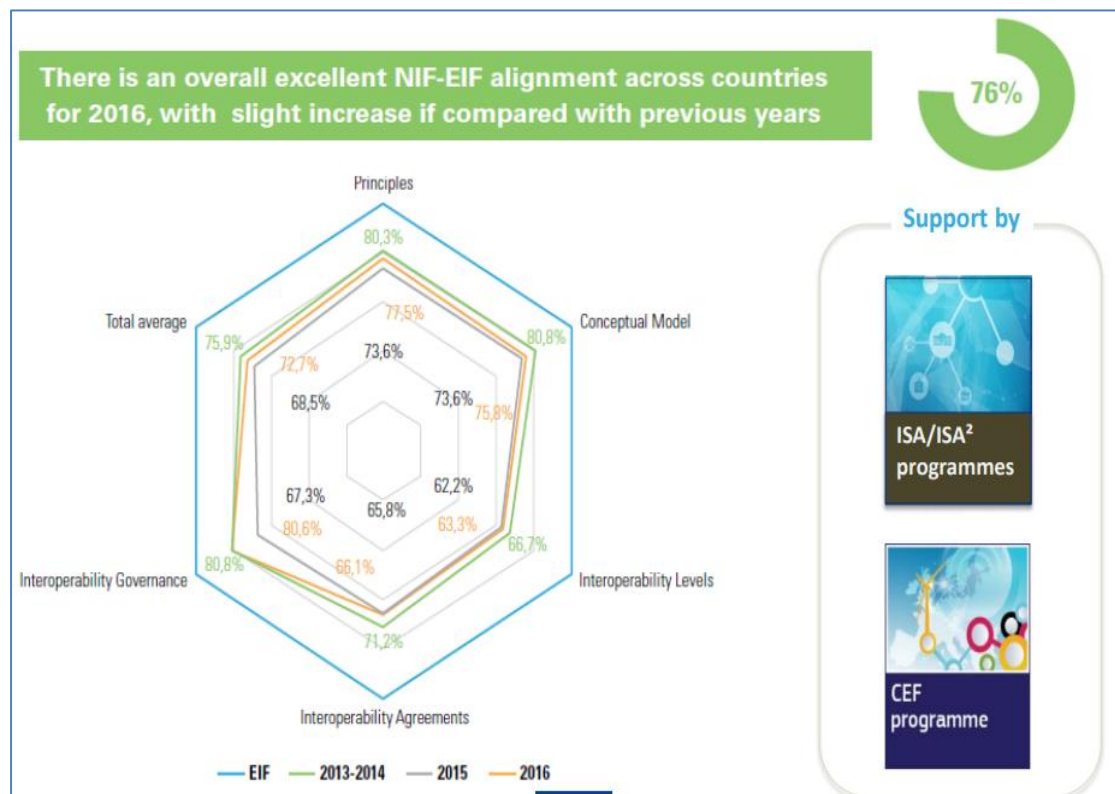


Figure 11:EIF and NIF alignment 2016 (extracted from [72])

2.3 Interoperability and Digital Public Services outside Europe

An important source for this chapter was the EC's International DESI (I-DESI)²² index, which compares the digital performance of EU countries with 17 non-EU countries (Figure 12). Furthermore, DESI evaluates the performance of individual EU countries – as well as the EU as a whole – and compares it to Australia, Brazil, Canada, Chile, China, Iceland, Israel, Japan, South Korea, Mexico, New Zealand, Norway, Russia, Serbia, Switzerland, Turkey and the United States.

According to citation [73], Finland, Sweden, the Netherlands and Denmark are the top four EU countries followed by Korea, the United States and Japan. However, the comparison shows that the EU's average in digital performance is significantly lower than that reported outside the EU. The Digitisation of Public Services as the indicator of e-Government, according to citation [74], “[...] is the one dimension where EU Member States performed on average below their 17 non-EU counterparts. Nine of the 17 non-EU countries, including South Korea, USA and Japan) had a higher score in 2016 than the EU average.” In the results of the same study for 2016 [74] – visualised in Figure 12 below, it is stated that “[...] the top four EU28 MS had an average score of 78.9 (out of 100) indicating relatively high levels of access to government data and information. Only Australia of the non-EU countries had a higher score. The bottom four EU28 MS had an average score of 48.3. Six of the non-EU countries had a lower score.”

Interoperability is not measured as an important component for both DESI and IDESI, although it should because it would help in better analysing and understanding the status of eGovernment as mentioned in the previous chapter, since interoperability is a crucial component. Another interesting outcome of this study is that EU countries in comparison to non-EU ones need to speed up in their implementation of eGovernment to increase their global performance.

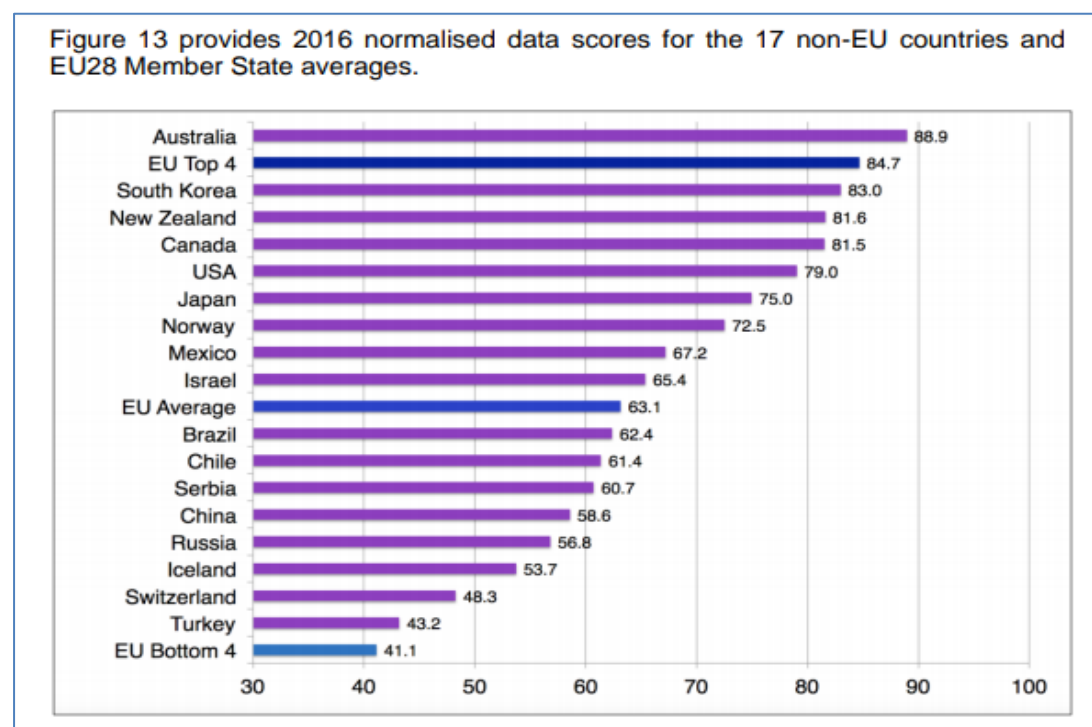


Figure 12: I-DESI 2018 Digital Public Services (Source: I-DESI)

²² The International Digital Economy and Society Index (I-DESI) measures the digital economy performance of EU28 Member States and the EU as a whole in comparison with 17 non-EU countries, using a similar methodology to the EU DESI index. I-DESI includes the same five dimensions as the DESI, but it is built on a slightly different set of indicators due to some of the DESI indicators not being available in non-EU countries. As a result, the I-DESI rankings and scores are slightly different to those of the DESI: (<https://ec.europa.eu/digital-single-market/en/news/international-digital-economy-and-society-index-2018>.)

2.3.1 Organisations outside the European Union

The study is not exhaustive in this thesis and merely includes only a few of the organisations that are involved with eGovernance. The major organisations that are studied in this thesis are two, along with one Institute: the Organisation for Economic Co-operation and Development (OECD), the United Nations (UN) through its United Nations Development Programme (UNDP), and the European Institute of Public Administration (EIPA).

This study can be further expanded to collect all organisations – not only the most important ones –, such as European and International Authorities, and Academic institutes that have interoperability and eGovernance in Public Administration in their curriculums. Some indicative examples are: the University of Aegean - School of Engineering Department of Information and Communication Systems Engineering (ICSD)²³, the Tallinn University of Technology²⁴, the Delft University of Information Technology²⁵, the Katholieke Universiteit of Leuven²⁶, the United Nations University²⁷, the Koblenz Landau University²⁸ etc.). In addition, private organisations that are also involved with eGovernment and enterprise or Business Interoperability Frameworks have a crucial role that can be further analysed. It is important to measure enterprise and business interoperability, too, since this will allow to find similarities and differences between such Frameworks; and, even though business-related, it could serve our purposes since the outcome will bring forth information related to IOP practices. The above-mentioned are reflected also in citation [75], *“Business interoperability involves specific characteristics of the inter-organisational design of a company's external relationships. It extends from the more technically focused notion of interoperability to cover organisational and operational aspects of setting up and running IT supported relationships.”*

In this area there are already several projects that adhere to the identification, analytics and metrics of the relevant field of eGovernment – for example, the Gov 3.0 project²⁹ – which can provide the use of new, advanced and disruptive technologies to contribute to the interoperability of those technologies. In this project, interoperability is mentioned as *“[...] a method for ensuring eGovernment 1.0 between systems and thus constitutes an important pillar for eGovernment 3.0.”*³⁰ [76]

2.3.1.1 OECD

The Organisation for Economic Co-operation and Development³¹ (OECD) is a forum of 30 countries covering the subjects of the economic, social and environmental challenges of globalisation. In addition, OECD helps governments respond to new developments, among other things, by providing the setting on which to policy experiences, identify good practices and boost collaboration. OECD's member countries are: Australia, Austria, Belgium, Canada,

²³ The current thesis is under the University of Aegean - School of Engineering Department of Information and Communication Systems Engineering (ICSD): http://www.icsd.aegean.gr/icsd/ereuna_en, the research lab of <http://icsdweb.aegean.gr/is-lab/the-lab/#> and <https://msc.icsd.aegean.gr/?lang=en>

²⁴ The Tallinn University of Technology- Ragnar Nurkse Department of Innovation and Governance: <https://www.ttu.ee/?id=147105>

²⁵ The Delft University of Information Technology- Faculty of Technology, Policy and Management: <https://www.tudelft.nl/en/tpm/about-the-faculty/departments/engineering-systems-and-services/>

²⁶ The KU Leuven- Department of computer science: <https://wms.cs.kuleuven.be/cs/english>

²⁷ The United Nation University: <https://unu.edu/>

²⁸ Koblenz Landau University -Computer Science- Institute for IS Research: <https://www.uni-koblenz-landau.de/en/campus-koblenz/fb4/iwvi/iwvi-description>

²⁹ GOV 3.0 project: <https://www.gov30.eu/>

³⁰ *“Government 3.0 refers to the use of disruptive ICTs (blockchain, big data and artificial intelligence technologies) in combination with established ICTs (distributed technologies for data storage and service delivery) and the wisdom of crowd (crowd-sourcing and co-creation) towards data-driven and evidence-based decision and policy making”.* The term from: <https://www.gov30.eu/egovernment-generations/>

³¹ OECD: <https://www.oecd.org/internet/> and OECD Digital Government: <https://www.oecd.org/internet/digital-government/>

the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States; the European Commission takes part as well.

In the working area of Digital Government – amongst the OECD initiatives – are: “the OECD going Digital Project”, “the OECD Digital Government Framework” and the “digital OECD toolkit”, that will be described briefly in the following sections.

2.3.1.1.1 OECD – Project Going Digital

The OECD project Going Digital³² started in 2017 to examine the effect of digital transformation in different policy areas. The input and the engagement from national experiences lead to a diversity of approaches, challenges and levels of development. In March 2019 the first phase of the project was concluded with the Going Digital Summit. Among the outcomes was the OECD privacy framework “Towards Global Interoperability”, where one of the principles is open standards and interoperability. Phase II will help countries to implement an integrated policy approach to digital transformation, with the “Going Digital Toolkit” and the “Going Digital national reviews”.

2.3.1.1.2 OECD – Toolkit

The Toolkit will help countries to assess their state of digital development and, in response, formulate policy strategies and approaches. Data exploration and visualisation are key features of the Toolkit. The Going Digital Toolkit (Figure 13) is structured along the seven (7) policy dimensions of the Going Digital Integrated Policy Framework [77]. The scope of the Toolkit is to identify gaps in the current measurement framework, assesses progress made towards filling these gaps and sets-out a forward-looking measurement roadmap [78].



Figure 13 OECD: Digital Toolkit (Source: <https://goingdigital.oecd.org/en/countries/grc/>)

Part of the OECD is the Observatory of Public Sector Innovation (OPSI)³³, that collaborates with Public Administrations for new technologies and provides public servants with knowledge and tools. The OPSI is referred here because it can play an important role in expanding interoperability in new technologies, among other possibilities.

³² OECD - Project Going Digital: <https://www.oecd.org/going-digital/project/>

³³ OPSI: <https://oecd-opsi.org/about-observatory-of-public-sector-innovation/>

2.3.1.1.3 OECD – Going Digital Integrated Policy Framework

The Going Digital Integrated Policy Framework according to citation [79], “[...] is designed to help governments and stakeholders to develop an integrated approach to policy making in the digital age and to shape policies for an inclusive digital future.” The Framework (Figure 14) has seven policy dimensions: 1) Access to communications infrastructures, services and data; 2) Effective use of digital technologies and data; 3) Digital and data-driven innovation; 4) Good jobs for all; 5) Social prosperity and inclusion; 6) Trust in the digital age; and 7) Market openness in digital business environments. The Framework also provide guidance on its implementation. This guidance is described in the report “*OECD Recommendation on Digital Government Strategies*”³⁴.



Figure 14 OECD: Going Digital Integrated Framework (Source: OECD) https://www.oecd-ilibrary.org/science-and-technology/going-digital-integrated-policy-framework_dc930adc-en)

2.3.1.1.4 OECD – Strengthening Digital Government

The concept to strengthen the Digital Government is part of the “going Digital” project. The transformation of digital government, their accomplishment and progress from analogue government to e-government and then to digital government, is examined through this research. According to citation [80], to achieve a mature digital government there are six main policy dimensions needed (Figure 15): the digital by design, the data-driven, the open by default, the user-driven, the government as a platform, the reactive from proactive policy making, and service delivery. Taking advantage of the similarities of the principles (such as open by default or data-driven etc.) with those of the EIF principles would be an important asset for EIFs evolution – with further accommodation and liaison among the Frameworks and guidance for implementation, of course.

³⁴OECD- Recommendation on Digital Government Strategies: <http://www.oecd.org/gov/digital-government/recommendation-on-digital-government-strategies.htm>



Figure 15: OECD: The six dimensions of Government Framework (Source: <http://www.oecd.org/going-digital/strengthening-digital-government.pdf>)

2.3.1.2 United Nations, UNDP and UNU

The United Nations (UN)³⁵ is an international organisation founded in 1945 and consists of 193 Member States. The Public Institutions and Digital Government (DPIDG) is a division of the United Nations Department of Economic and Social Affairs (DESA). It provides secretariat support to the United Nations Programme in Public Administration. The mission of this division is to assist the Member States of the United Nations in advancing the implementation of the 2030 Agenda and the Sustainable Development Goals, including the fostering of effective, efficient, transparent, accountable, inclusive and innovative public governance, administration and services for sustainable development [81]. The DPIDG, in collaboration with the United Nations University (UNU), initiated in 2017 the research project “Digital transformation and emerging technologies”. This research project explores “[...] the Digital transformation and emerging technologies in the Public Sector.”³⁶

UNU was created to provide knowledge in this field under the auspices of the UN. As is stated in its mission [82], “[...] the United Nations University (UNU) is a global think tank and postgraduate teaching organisation headquartered in Japan. The mission of the UN University is to contribute, through collaborative research and education, to efforts to resolve the pressing

³⁵ UN, <https://www.un.org/en/about-un/> and DPIDG <https://www.un.org/development/desa/en/publications/publications/welcome.html> with the library :

³⁶UNU: Digital transformation and emerging technologies:<https://unu.edu/projects/digital-transformation-and-emerging-technologies.html#outline>

global problems of human survival, development and welfare that are the concern of the United Nations, its Peoples and Member States. ”

2.3.1.2.1 United Nations – Global eGovernment Index

The E-Government Development Index (EGDI)³⁷ is a biannual report by the UN’s Department of Economic and Social Affairs (UN DESA). The current release of 2018 has the updated data on the development of e-Government in the United Nations’ Member States. The EGDI is a composite indicator that consists of three equally weighted indexes (Online Service Index, Telecommunication Index and Human Capital Index) for broad range of e-government topics. According to EGDI [48], *“Europe is the leading continent regarding e-Government development and the European countries perform better when compared to the Americas, Asia, and Africa, with Denmark, Australia and Republic of Korea to be the leaders in the field”* (Figure 16). The 2018 report assesses the portals of seven cities in Africa, 6 in the Americas, 13 in Asia, 12 in Europe, and 2 in Oceania. These portals are assessed according to: technology, content provision, services provision and participation and, engagement. In this report of 2018, the UN focused on the local e-Government development in 40 cities across the world. Moreover, according to the same report [48], *“[...] almost two thirds of 193 United Nations Members States demonstrate a high-level of e-government development with EGDI values above in the range of 0.5 and 1. The share of countries with low e-government levels, in the range of 0 to 0.25, has dropped by a significant 50 percent, from 32 countries in 2016 to 16 countries in 2018.”*

³⁷ UN- eGovernment surveys: <https://publicadministration.un.org/en/research/un-e-government-surveys>

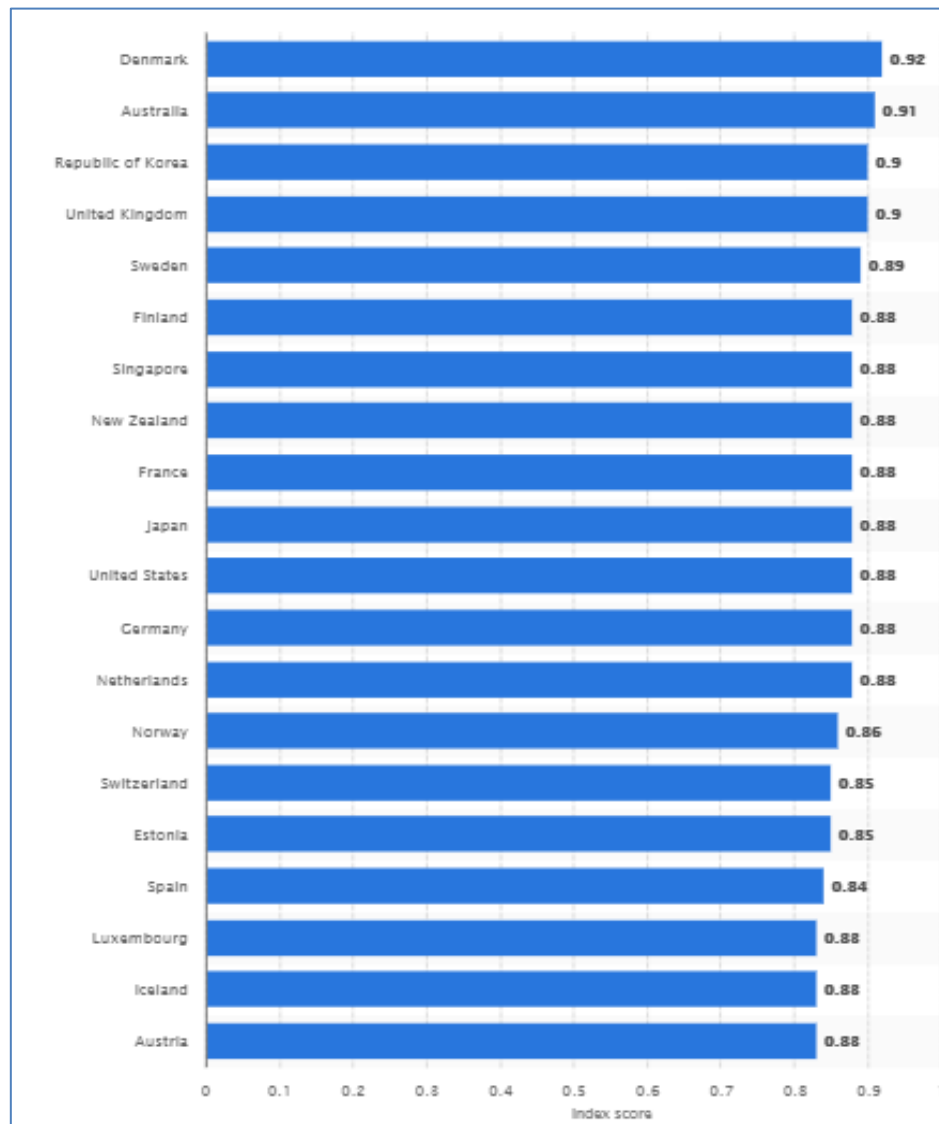


Figure 16: UN: 2018 World e-government leaders based on EGDI38

2.3.1.3 EIPA

The European Institute of Public Administration³⁹ (EIPA) was founded in 1981 with the support of the EU Member States and the European Commission (EC). EIPA's mission is to provide practical knowledge about EU policies to all professionals related to EU public affairs, with the key objective of further improving their skills and capabilities. The institute provides a plethora of courses and studies in the field of EU Governance and is co-funded by EC's Erasmus+⁴⁰ programme.

³⁸ World e-government leaders based on E-Government Development Index (EGDI) in 2018 extracted from <https://www.statista.com/statistics/421580/egdi-e-government-development-index-ranking/#statisticContainer>

³⁹ The European Institute of Public Administration – EIPA: <https://www.eipa.eu/>

⁴⁰ The European Union's Erasmus+ programme is a funding scheme to support activities in the fields of Education, Training, Youth and Sport. https://eacea.ec.europa.eu/erasmus-plus_en

2.4 Interoperability and the Greek NIF

The first Greek Government's strategic approach to e-government was in 1999 with the white paper *"Greece in the Information Society: Strategies and Actions"*, and the Greek Digital Strategy in 2005. The objective of both documents was to set out the new Greek policy for the development of ICT. The white paper presented a comprehensive strategy, defined priorities and specific goals, as well as resources and mechanisms for achieving them, and its basic objective was the development of an "open and effective" government [83]. A lot have changed since the first initiatives, and today we have an eGovernment Strategy planned at regular intervals. The term Interoperability was mentioned only in the most recent versions of the strategies.

The national Interoperability Framework eGIF is an important component of the eGovernment Strategy⁴¹ 2014-2020 and eGovernment Action Plan 2016-2020, and interoperability is one of the principles of the strategy and a target for the strategic orientation for horizontal ICT policies in PAs (**Figure 17: Principles of eGovernment Strategy 2016-2020**Figure 17). The vision of the strategy according to citation [84] is "[...] by 2020, Greece aims to build a more efficient, transparent and accountable administration, through the use of ICT and the support of the necessary governance and monitoring mechanisms, while maximizing constituent satisfaction, increasing participation and recovering confidence by offering constantly enhanced electronic services and promoting a new digital culture." In order to accomplish this the e-Government Action Plan 2014-2020 [85] outlines specific projects, stakeholders, timeframes and funding in alignment with the NSRF- ESPA 2014-2020⁴². In the Action Plan, one of the three strategic axes of intervention for the modernisation of State and Administration is the focus on interoperability and compliance between all administration systems and services; the eGIF is one of the basic components to be taken into consideration, too.



Figure 17: Principles of eGovernment Strategy 2016-2020

⁴¹ During the submission of this document in February 2020, there was no public available data for an update strategy or action plan in any official gazette or government web page.

⁴² NSRF- ESPA, 2019, Structural and Investment Funds for operational programs (sectoral, regional, territorial) in Greece: <https://www.espa.gr/en/pages/OperationsList.aspx>

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The eGIF [86] is the national implementation of the European Interoperability Framework. The first and only version of the Interoperability Framework was the framework that was published initially in 2007; however, just one year after – in 2008 – it was in the official Government Gazette described as the eGIF, the Greek Interoperability Framework – or National Interoperability Framework, as it is often referred to. The responsible Public Authority for the Framework was the former Ministry of Interior – General Secretariat of Public Administration & e-Government (ΥΔΜΕΔ-ΥΑΠ)⁴³, and the under-contract Authority was the Information Society SA (ΚΤΠ Α.Ε) [87]. The Framework project – with concrete tasks to be implemented from the Contractor – had a duration of two years and was titled “Greek Framework for Service and Electronic Government Interoperability Standards”. It was designed to study the Service Framework of Electronic Government and the development of interoperability standards for the Greek Government. The contributors of the project, in collaboration with the Competent Authority, was a union that included private companies, subcontractors and the University Research Institute of Communications and Computer Systems of National Technical University (NTUA).

An interesting point was that the user profiles for the Framework were not only the Greek Public Administrations at a central, regional and local level but also the citizens and businesses, including foreign bodies [86]. Another interesting point worth mentioning is that the Hellenic Ministry of Interior and Administrative Reconstruction was responsible for the maintenance of the Greek eGIF⁴⁴, in co-operation with public agencies in Greece; and, although there was a Competent Authority for the maintenance of the Framework, there has been no maintenance or revision up and until now. As already identified in citation [88], the inner context of organisation is an important Risk factor for failure.

One of the outcomes of this project was the portal www.e-gif.gov.gr, which holds the interoperability registry (i.e., a database that includes service process models, XML schemas for several documents, and predefined code lists) [86]. The results of the Framework regarding e-services, responsibilities, processes, documents, data, XML schemas, core components, code lists etc., are currently stored in the interoperability registry hosted by the Public Administration National Portal "Ermis" (www.ermis.gov.gr).

The main legal document that describes the Greek NIF was issued in 2012 in a Ministerial Decision focusing on the “*Greek Framework for e-government services provision*” (Government Gazette 1301/B’/12-04-2012) [89]. This Ministerial decision was the outcome of an action that started in 2008 exploiting the provision of article 27 of the Law 3731/2008 (Government Gazette 263/A/2008). The Decision not only acts as the legal instrument for its implementation but also describes, in detail and per article, the scope and all the entities of the Framework. According to citation [89], the National Electronic Governance Framework comprises a set of rules, standard procedures, specifications and procedures applied in eGovernment projects as per their design, development, maintenance and operation. The two (2) main objectives of the Framework are:

- Establishment of a common framework for implementing e-government services to public bodies, businesses and citizens i.e., provision of guidelines;
- To support effectively eGovernment at Central, Regional and Local level and contribute to achieving interoperability at the level of information systems, procedures and data.

⁴³ The Greek Ministry of Digital Governance was initially formed on 2011 as the Ministry of Administrative Reform and Electronic Governance: [https://en.wikipedia.org/wiki/Ministry_of_Digital_Governance_\(Greece\)](https://en.wikipedia.org/wiki/Ministry_of_Digital_Governance_(Greece)).

⁴⁴ In this research the acronym eGIF or the National Framework or Greek National Framework or the Greek interoperability Framework is used instead of the Greek E-Gif.

2.4.1 Architecture of the Greek NIF

The Greek National Interoperability Framework consists of different components which can be updated separately or as a whole. In detail, the framework includes:

- Design, development, maintenance and operation of websites and information systems of Public Administrations;
- The development and supply of integrated electronics services provided by public sector bodies;
- Ensuring interoperability in organisational, semantic, technological and technological level, for data exchange between information systems for public sector bodies;
- Registration, identification and online recognition of citizens and businesses in electronic services of the public sector;
- Managing the Registry for the registration of services provided by public authorities (Interoperability Register).

As visualised in Figure 18, the Greek NIF is one of the three pillars of the architecture of eGovernment Framework together with the Registry of Interoperability and the Educational specifications⁴⁵ and supporting material. This shows the strong link between eGovernment and interoperability initiatives in Greece.

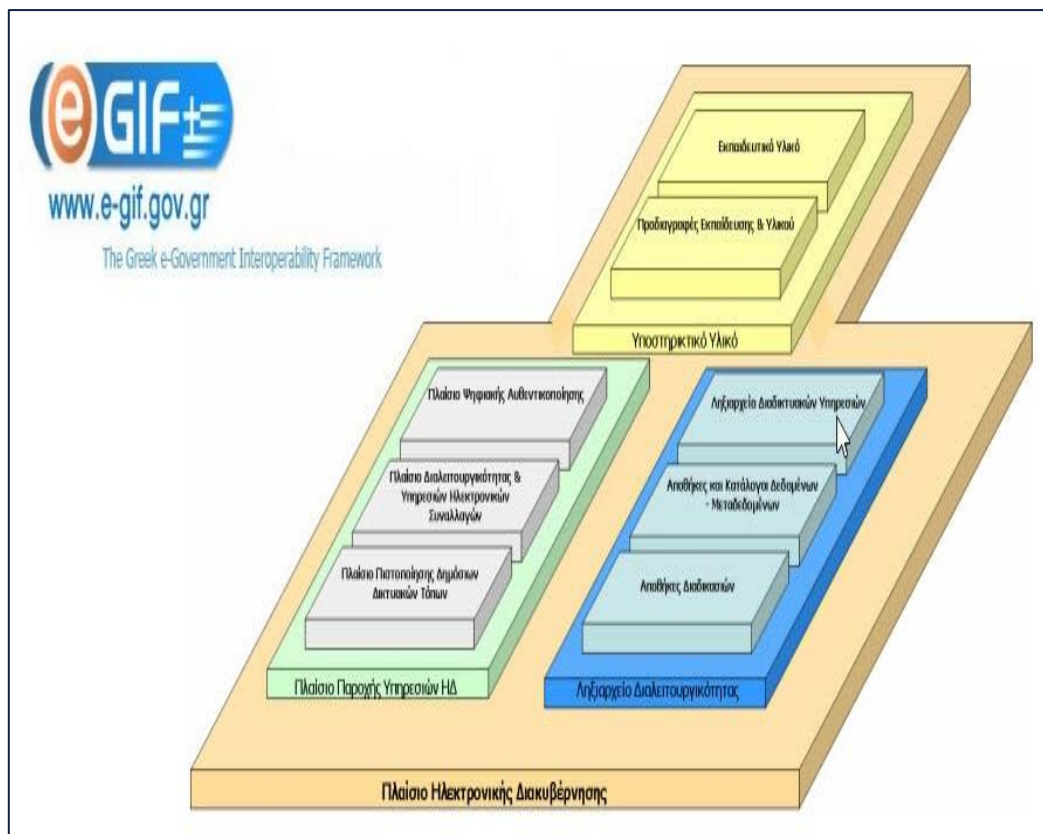


Figure 18: Architecture of eGovernment Framework with eGIF (Source: www.e-gif.gov.gr)

⁴⁵ The educational material for all the theoretical and practical aspects of the above, with a view to provide rapid transfer of knowledge to all employees of Public for the maintenance of those standards and frameworks. Although, is mentioned in the official portal there is no training material publicly available apart from a current course in EKDDA, (<http://resources.ekdd.gr/gnosis/index.php/3-26/136-interop>).

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eGIF has the following first three basic components, and the rest as supporting documents [86] [89]:

- 1) 'The Certification Framework for Public Administration Sites and Portals', focusing on the interaction between e-government services and citizens, by defining the guidelines and standards to be followed when designing, developing and deploying eGovernment portals and supporting eGovernment services.
- 2) 'The Interoperability and Electronic Services Provision Framework' focusing on the interaction among public sector bodies and the exchange of data and reuse of services by defining the basic principles and the general strategy to be followed by public agencies, when developing eGovernment Information Systems. Moreover, guidelines for the documentation of processes and data were defined for interoperability purposes facilitating collaboration among public services.
- 3) 'The Digital Authentication Framework', which sets the standards, the procedures and the technologies required for the registration, identification and authentication of users (Citizens / Enterprises).
- 4) 'The Documentation Model', which has to do with the development of metadata standards and XML schemas.
- 5) 'The Conformance Checklist' with the e-Government Interoperability Framework. This is a very useful document especially for the assessment of the Framework, but also for the evaluation and compliance of public services.
- 6) Data Schema EIF for the first publication of standardised XML schemas as those were designed for the needs of the Greek Interoperability and Electronic Services Provisioning Framework (or e-Government Interoperability Framework - e-GIF).
- 7) XML Files (List of approved e-GIF Core Components, List of approved e-GIF Business Information Entities, and List of approved Code Lists and of Identifier Lists, Documents of Greek Public Administration in XML Schema).

3. Methodology

The methodology of this thesis mainly is based on desk analysis and literature review, the work done in two articles and one questionnaire, and the study that is further analysed in this thesis. The workflow of the methodology is visually described in Figure 19. The research initially starts with an analysis in the field of interoperability, followed by the related policies and frameworks in eGovernment. The focus is on the landscape status in Europe and then in Greece for the case study. Information from the literature review and desk research is then gathered for the landscape analysis, with an addition of information from the initial chapters of the articles.

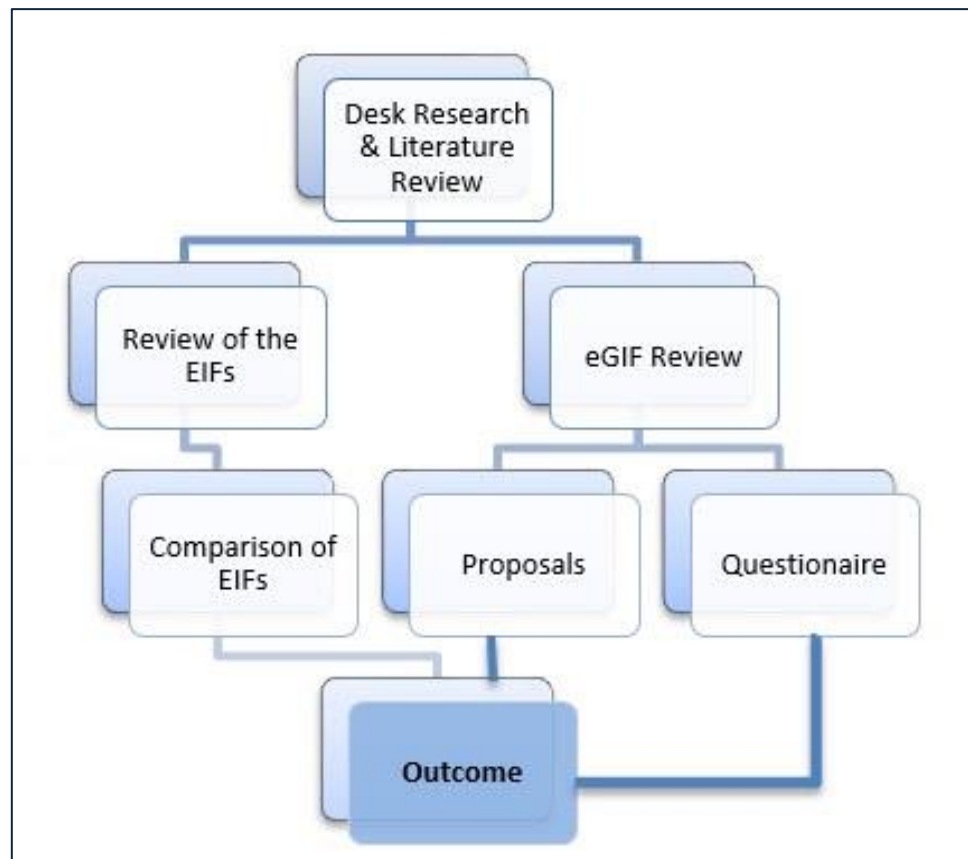


Figure 19. Methodology of the Thesis

Moreover, apart from the literature review and the desk research, the methodology and the outcomes of each article are presented in the following chapters. The study starts with the results from the first article: “Kalogirou V., Charalabidis Y., The European Union Landscape on Interoperability Standardisation: Status of European and National Interoperability Frameworks, in *Proceedings of the I-ESA Conferences, vol 9. Springer, Cham, Berlin, 2019*” [1], that was presented in 2018 at the I-ESA Conference in Berlin⁴⁶. The results of this review are presented in Chapter 4 with the review and gap analysis and comparison on the interoperability status of European and National Frameworks. The next step of this research was a review on the status of the Greek National Interoperability Framework. This study made a review on the current Framework and provided proposals for its update after identifying existing gaps, and proposed some major technological trends that could be taken into

⁴⁶IESA Conference 2018: Interoperability for Enterprise systems and applications: (http://iesa2018.ipk.fraunhofer.de/fileadmin/user_upload/IESA2018/Documents/program_detailed.pdf) Agenda: (http://iesa2018.ipk.fraunhofer.de/fileadmin/user_upload/IESA2018/Documents/program_detailed.pdf).

consideration for its update. The results of this study will be presented in ICEGOV2020⁴⁷ in Athens with the title “Kalogirou V., Stasis A., Charalabidis Y., *Adapting National Interoperability Frameworks beyond EIF 3.0: The case of Greece*” [2]. The results of this study are further presented here in Chapter 5.

In addition, this research took into consideration the thesis work done – in the Greek language – by two master students of the University of Aegean. The first one is “*N.Vogiatzis, Questionnaire for the self-assessment of the Competent Authorities for the implementation of the Interoperability Framework: The 50 Major Municipalities, 2016*” [90], from which the methodology and certain questions were reused for the current questionnaire – which is analysed in Chapter 6 – for the proposal for update of the current eGIF to an updated version beyond EIF v3. The second one is the work of “*V.Raptis E-Governance Framework - Evaluation and Certification Tool for Public Administrations, 2019*” [91] for the proposed tool for evaluation of the eGIF that can be reused to evaluate the current status in the Competent Authorities for eGIF.

3.1 Research Question

The research question of this thesis is to propose an update of the Greek National Interoperability Framework (eGIF). The outcome and proposals will be made after identifying the landscape of Interoperability and Interoperability Frameworks, mainly in Europe. Initially, the study focuses on the status of the Interoperability Frameworks and eGovernment Policies for the Public Sector. The question why interoperability is crucial for eGovernment is further analysed. The main components of interoperability such as organisational, legal, semantic, and technical aspects and their links with other International Standards and Interoperability Initiatives are explored to propose guidelines and recommendations for the Greek eGIF. This thesis also aims to provide feedback for the update of the next-generation eGIF and to justify why it is important to have it updated and at a regular basis. The National Interoperability Frameworks of other countries and e-Government Statistics and metrics of Interoperability in Greece and the EU are examined to measure and justify the need for the update.

3.2 Methods and tools

In this research, the main methodology is the literature review and desk research as described in the introduction of this chapter. Microsoft’s Excel spreadsheet software was used as a tool to collect and organise the data and to provide the charts for the outcomes of the comparisons among the three versions of EIF, in the first published article. The second article took into consideration the results of the first article and further made a list for proposals by also enhancing it with data from Greek national regulations and other relevant policies and initiatives, plus emerging technological trends. Finally, an online questionnaire was created for the assessment and evaluation of the proposed updates to eGIF.

⁴⁷ ICEGOV 2020 International Conference on Theory and Practice of Electronic Governance: (<http://www.icegov.org/about/>), Conference track of the article : (<http://www.icegov.org/submit/tracks/>).

4. Review and Gap Analysis of the EIFs

This section, as described in Chapter 3 – Methodology, is the outcome of article: “*Kalogirou V. Charalabidis Y., The European Union Landscape on Interoperability Standardisation: Status of European and National Interoperability Frameworks, in Proceedings of the I-ESA Conferences, vol 9. Springer, Cham, Berlin, 2019*” [1]. This article reviews the status of the three EIF versions for commonalities and differences among them, and further analyses the EIF principles. This version will be the basis for the update of the Greek eGIF, which is analysed, in the next Chapter 5. The structure of the article is the following: first is the introduction with section 1.1. Meaning of Interoperability for Governments followed by 1.2. Interoperability frameworks in Europe. These sections present the status of eGovernment in Europe, the interoperability timeline, the terms and the identified problems. The second part presents the ISA² programme and the European Interoperability Framework. This section makes an analysis of its structure and its basic components and presents the status of all three versions of EIF (v1 2004, v2 2010, v3 2017) and the alignment of the second EIF version with the NIFs⁴⁸. Then it categorises and groups together the principles, the layers and the recommendations to include them as part of the methodology of Chapter 3. Finally, in Chapter 4, are the findings and discussion, while in Chapter 5 the conclusions follow. The results and methodology of this article are presented below.

4.1.1. Methodology

In this article, the research methodology that was followed was to divided the research questions in two parts (Part A and Part B) and then to set a categorisation (abbreviation and numbering) to compare the elements.

- I. **Part A:** Compare EIF v1 and EIF v2 with EIF v3 to see commonalities, differences and to discover the status of interoperability issues from 2014 to 2017.
- II. **Part B:** Compare the principles of EIF v3 with the values from the previous comparison (part A) to see the differences between EIF v3 and EIF v2 principles' recommendations (19 of the 47 recommendations were examined). The comparison measured the level of alignment (0-4) with the data that are available from the current NIFs, plus a few NIFs from a few selected non-EU countries.

Accordingly, taking into consideration the structure of the EIFs, a matrix categorisation was proposed to measure their differences. The following matrix for the basic elements of EIF v3 was proposed:

- Recommendations as (R);
- Categories as (C);
- Principles as (P);
- Layers as (L);
- Conceptual model for integrated public services as (M);
- Interoperability governance as (LIG);
- Integrated public service governance as (LPS);
- Legal interoperability as (L1);
- Organisational interoperability as (O2);
- Semantic interoperability as (S);
- Technical interoperability as (T);
- Conceptual model for integrated public services: Internal information sources and services as (MC1);

⁴⁸ The 3rd version of the EIF is part of the Communication (COM(2017)134) from the EC and was adopted on 23 March 2017 before the submission of this article to the I-ESA Conference but the research was in progress and there were not data -yet- to include in this research that started before the publication of v.3 of EIF.

- Conceptual model for integrated public services: Base registries as (MC2);
- Conceptual model for integrated public services: Open data as (MC3);
- Conceptual model for integrated public services: Catalogues as (MC4);
- Conceptual model for integrated public services: External information sources and services as (MC5);
- Conceptual model for integrated public services: Security and privacy as (MC6).
- Each (R) have the following abbreviation, example 1: “R1.P1.C1” that stands for Recommendation 1 of Principle 1 that belongs to category 1; example 2: “R36.MC1”, which stands for Recommendation 36 of Conceptual model for integrated public services: Internal information sources and services.
- In each of the elements “a change Score” was given according to the recommendations: “0” same Recommendation, “1” rephrase of Recommendation, 2 new or major change of the Recommendation. In some cases, the score “2” was given although it had the same basis with the previous EIF recommendation; however, the change as a whole was affecting the Recommendation, hence the score.

Moreover, in Part B the same methodology as in Part A was followed, along with the matrix of abbreviations and numbering. The scoring was calculated differently. The values were taken from the NIFO analytical model [71] to measure the alignment with EIF: “0 not aligned”, “1 partially aligned”, “2 aligned”. In the selected countries for which there were no available updated public data from the NIFO model, an estimation was proposed or an older available version of the NIFO model was used to measure the alignment. Important reference to this research were interoperability reports from Europe for the years 2016 and 2015, and the MS eGov factsheets (years 2014-2017) [70] ⁴⁹ with the latest eGov policies and initiatives and the State of Play for Interoperability Reports (years 2013-2016) [69]. The examined countries are: Austria, Belgium, Bulgaria, Cyprus, Czech, Croatia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Iceland, Italy, Latvia, Lithuania, Luxemburg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, UK, Australia, New Zealand, Bhutan. To the extent of this research, the values from the 2016 NIFO alignment Models were modified to fit the new EIF recommendations, except for Greece [92] and Hungary where no available online data were available. Furthermore, for the non-EU countries an estimation was made, as close as possible, to fit the comparison matrix with the alignment of their national frameworks.

4.2 Findings of the Review

4.2.1. Part A: Comparison of EIFs

The comparison of EIF v1 and EIF v2 with EIF v3 to see commonalities, differences and to discover the status of Interoperability issues from 2014 to 2017, is analysed below.

In the results of the comparison between EIF v3 and EIF v2 there is an alignment with policy developments, the emerging technological trends, the interoperability governance with the integrated service delivery, the information management (big and open data), EIRA and with security and privacy. Although the alignment for the countries was 75% in 2016, still more concrete recommendations are needed to ensure implementation by 2020, which is the time-frame of the Interoperability Action Plan. EIF v2 has no time-frame for its actions to be implemented. The Framework has twenty-five (25) Recommendations, the same twelve (12) Principles – that slightly differ in numbering, and two new modifications: in Principle Five (5) the data portability and in Principle Twelve (12) the assessment of effectiveness and efficiency.

⁴⁹The Digital Government Factsheets are published as part of the National Interoperability Framework Observatory (NIFO) project of the ISA2 programme and they are covering 2014-2019. As part of this article, the data that were used form year 2014-2017. In the first chapter of this thesis, the following data from 2018 and 2019 were used as reference to update the information of this document.

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As a general comment, the majority of the Recommendations refer to Public Administrations, which means that the Framework was mainly designed for Public Administrations and does not consider the private sector.

The comparison of EIF v3 and EIF v1 shows that the structure of EIF v1 is more generic and highlights the absence of a schema in relation to the next two versions. The number of recommendations and principles are fewer but most of the issues, policies or approaches were further elaborated, and the technological development was taken into account in the next version. EIF v1 was focused on open standards while EIF v2 on open specifications. PAs can decide to use fewer open specifications if open specifications do not exist – or do not meet functional interoperability needs – and adapt NIFs. The services are referred to as “eservices” rather than precisely specifying them. The terms of open data and openness were not viable at that time. The description of semantics and open standards, and the need for multilingualism in technical aspects, along with the independency of proprietary technologies were recognised early and still exist today.

The majority of the recommendations were modified and the need is obvious for frequent updates of the EIF according to the technological changes, policies and inputs from previous EIFs. Added to this, there are some basic recommendations, such as transparency, that are major elements of the Frameworks and should be further elaborated. Concisely, the same interoperability issues identified as problems – or to be taken into consideration from 2004 – are still vivid, and the underlying concepts are the same although differ in wording or format. A summary of results obtained by the proposed comparisons as a baseline of the EIFs recommendations, along with the previous Frameworks’ recommendations is visualised in Figure 20, Figure 20: EIFs Recommendations comparison and presented in the tables of Annex I.

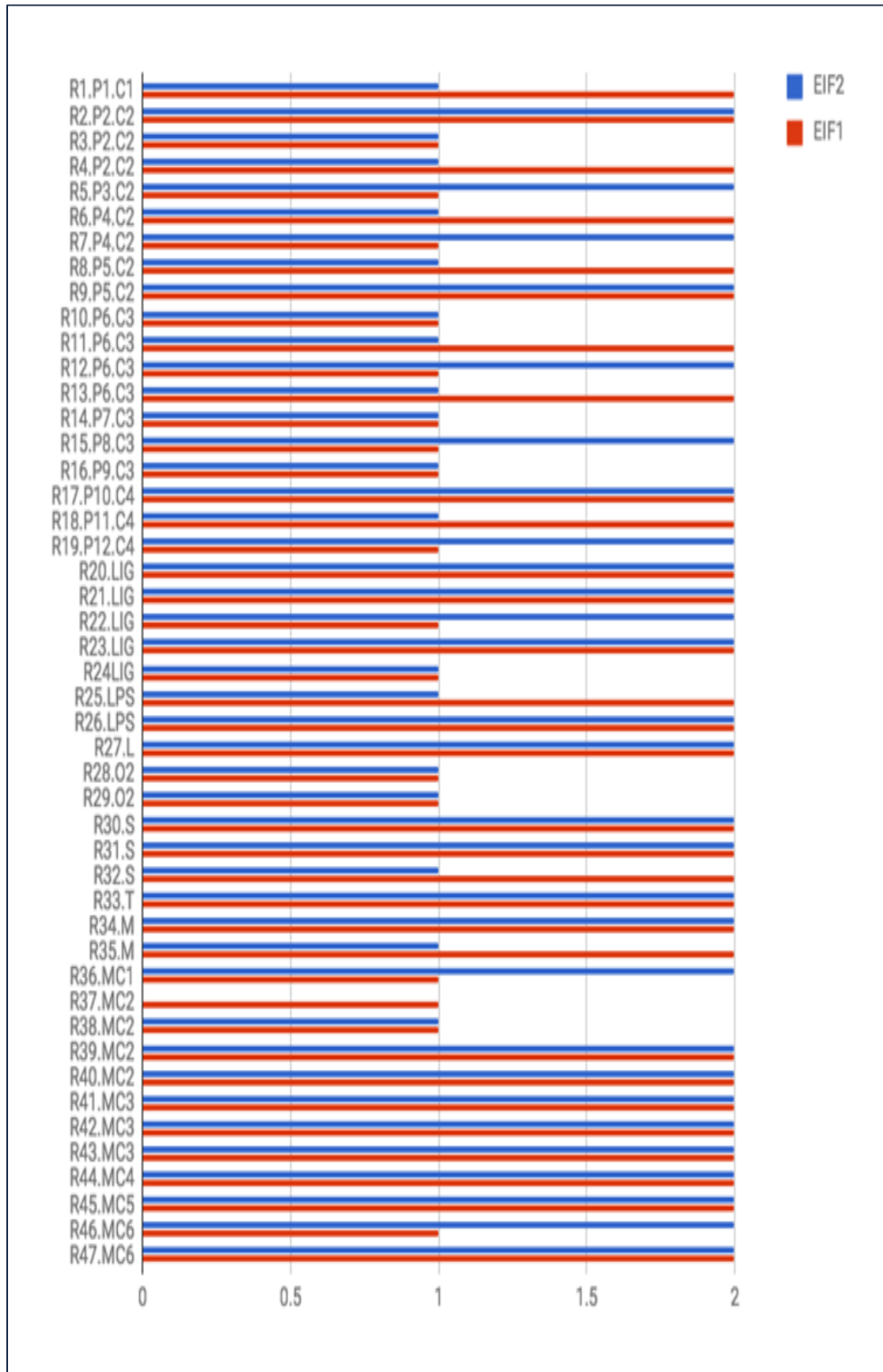


Figure 20: EIFs Recommendations comparison

4.2.2. Part B: Comparison of the 12 principles' recommendations

In this part, the comparison of the principles of EIF v3 with the values from the previous comparison (in Part A) is presented to see the differences between EIF v3 and EIF v2 principles' recommendations (19 of the 47 recommendations were examined). The comparison measured the level of alignment (0-4) with the data that are available from the current NIFs, plus a few NIFs from a few selected non-EU countries. These results show us that what was proposed in all the recommendations of EIFs in the majority of the countries' NIFs still needs to be aligned and implemented within a very strict time-frame, according to the IOP Action Plan; otherwise, the same barriers for implementation will still remain. Some recommendations, e.g. open data, is discoverable per each country but for others it is not visible to measure, e.g. the preservation of information. For the non-European countries' score the alignment was measured to the recommendation without the European Dimension; in cases where common terminology was used it was easier to measure from the matrix. In addition, the principles that are still difficult to achieve from 2004 to this day in most of the countries – even the more technological advanced – are: multilingualism, administrative procedures, preservation of information, and measurement of effectiveness and efficiency. This research needs to be extended to apply to all EIF recommendations and further combine the alignment with the measurement of the actual implementation in each of the countries with EIF v3. The results of this comparison are visualised in the following Figure 21Figure 21.

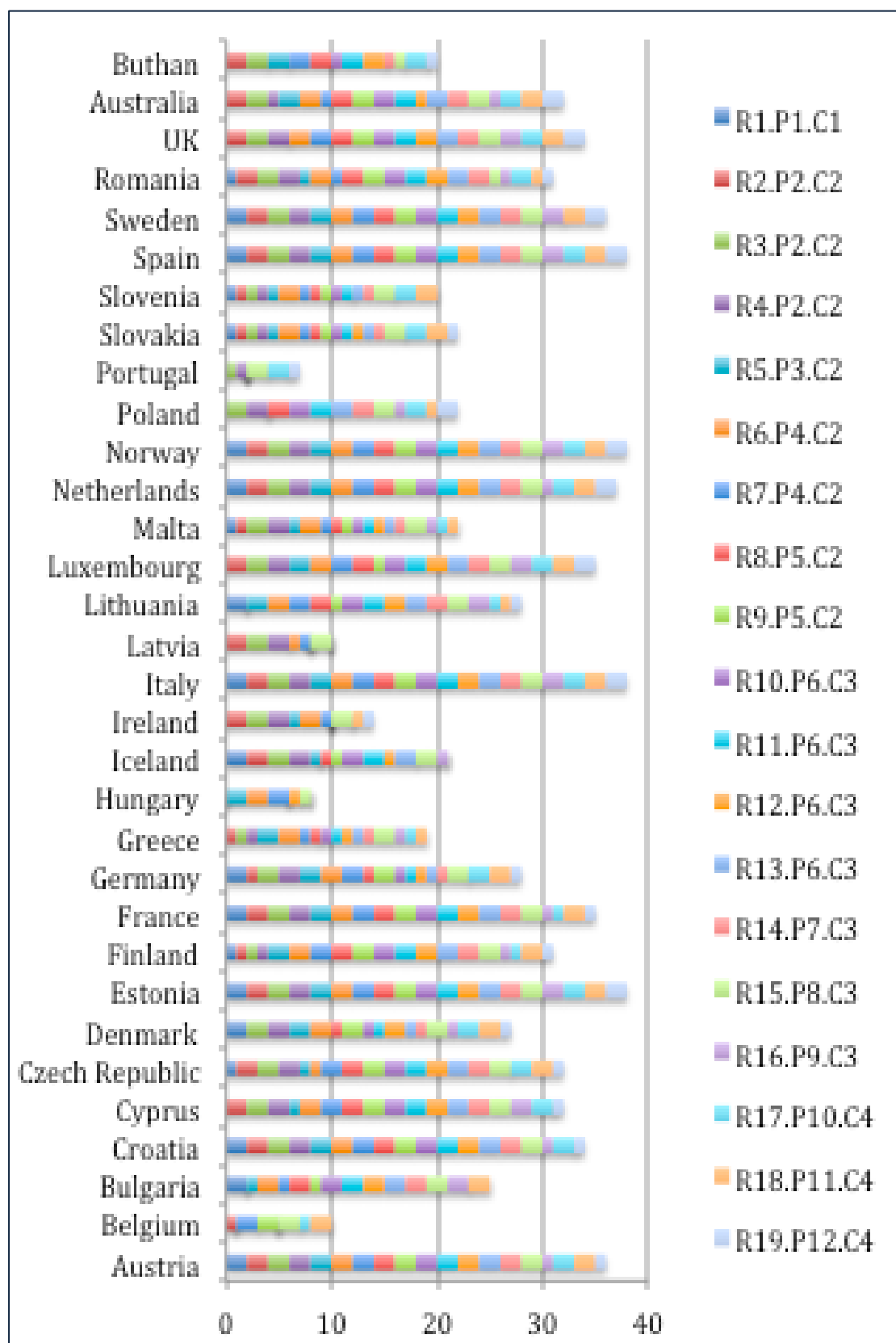


Figure 21: Summary of the alignment in principles between EIF and NIFs

5. The proposed new eGov Framework

This chapter presents the outcome of the article: “Kalogirou V., Stasis A., Charalabidis Y., *Adapting National Interoperability Frameworks beyond EIF 3.0: The case of Greece*” [2] that will be presented in ICEGOV2020⁵⁰. The article reviews the Greek National Interoperability Framework, eGIF, and makes recommendations for its update. The recommendations are proposed after identifying the existing gaps and the major technological trends that should be taken into consideration. In this article, the structure is the following: in the introduction is the rationale and background information of why interoperability is a key factor for digital services; in Chapter 2 is a brief introduction of the description and status of EIF and other National Interoperability Frameworks; In section 2.1, the main points of the Greek Interoperability Framework are presented and then, in Chapters 3 and its section, 3.1, the approach and the assessment criteria for the update of the EIF are described; in Chapter 4, and its sections, the results along with discussions appear, with the findings of incorporation in the NIF of the new Greek and European legislation, the compliance among the Framework and EIF v3, the EIF strategy, the Tallinn Declaration on e-government, and other initiatives. The findings are organised according to the layers of EIF. The future work and conclusions are in the last chapter. The basis of this article is the EIF, in conjunction with new legal and policy provisions, in order for the Greek eGIF to be more sustainable and adaptive to changes in the national framework. The work in this article also aims to give practical proposals for defining an interoperable Governance and Policy-Making. The article concludes to concrete proposals for the update of the Greek eGIF, considering the complex environment of interoperability and e-government services. The methodology, the results and the conclusions of this article are presented below, while the terms that appear in the first parts that introduce the EIF and eGIF could be viewed in Chapter 3, under section 3.1 Definitions and Status.

5.1.1. Methodology

The challenges of reviewing the Framework were not only in gathering knowledge from the European and / or international examples, nor suggesting actions for its actual implementation; rather, it was to adhere not only to a sophisticated Framework, but to a Framework with a citizen-centric approach ready to deal with the impact of new technologies [93] [41]. There was no dilemma, either, of whether the objectives of the update of the Framework should go beyond EIF v3; since it does not impose a legal obligation to Member States, a need for a more sustainable solution could be made, having in mind the requirements of the future. For this reason, the first part of this research was to find a plan for continuity, while the second part was more practical with dealing with assessment criteria for updating the framework.

5.1.1.1 Plan for eGIF

The plan for the Framework should have a time-frame and associated actions that should be taken into consideration before and after the update of the Framework:

1. A proposal for the initialisation plan for the update of the framework;
2. A desk research that starts with a comparison of the Framework with EIF v3, on the main principles and alignments for the eGIF implementation;
3. A desk research to identify the varying gaps from legislation, technological trends, other initiatives, research articles and best practices that can be reused. The research is not exhaustive but can provide a first-hand basis, since such public research information for the update is not available until now;

⁵⁰ ICEGOV 2020 International Conference on Theory and Practice of Electronic Governance: (<http://www.icegov.org/about/>), Conference track of the article : (<http://www.icegov.org/submit/tracks/>).

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4. An Implementation Plan. The implementation plan for the update of the Framework has the following main pillars:
 - a. The early creation of the eGIF strategic plan with the actions, activities, actors and timeframe;
 - b. The creation of a project which follows a project methodology with all the phases of a project's life (initiation, planning, implementation, closure), but to also include evaluation and redesign in the closure, not only as an assessment but in such a way in order to have long term results and ensure its continuity;
 - c. In the initiation phase tackle the status with European and international examples; in the design and implementation phase tackle the technological trends and make an open consultation for citizens and business;
 - d. A National Interoperability Framework is an important factor for an eGovernment action plan and must be properly organised. It should include organisational infrastructures for processes and data, technological Infrastructures for Government Architecture of Public Sector and Cloud Infrastructures, infrastructures that include the involvement of citizens; attention should also be given to education for the digital skills, and how to properly implement the Framework [94] [95] [57];
 - e. Ensure practical measures for its sustainability and continuity regardless of governance and political changes, actions for its sustainability and continuous reform, such as harmonising it with a digital National strategic plan. The plan will align and implement Digitalisation with the National Digital Strategy, digital and/or any eGovernment Action Plan operational programmes, such as ESPA, and/or other research, technological, development and innovation programmes, both at sectoral and regional programs and, other funding programmes and instruments, eGovernment actions and regulations which are relevant. This means that there is a necessity for legal amendments;
 - f. Perform in the initiation phase a gap analysis and take into account parallel actions for the proposed changes;
 - g. Take into consideration the proposals and findings of this research article as a basis for a plan and gap analysis.
5. The outcomes;
6. Reengineering process (steps 2-6) for the regular revision.

5.1.1.2 Assessment criteria for recommendations for eGIF

The main objective of this study for the Greek eGIF is to identify the gaps and the needs, and propose actions that would allow the Greek eGIF to be updated with, as well as adapt to the new challenges that the European and Greek environments require. Since 2012, with the issue of the Ministerial Decision, there was no systematic action for updating the Greek NIF, so a lot of new initiatives and aspects were not included, although some cases were introduced in the Greek Legislation. The research for the criteria was done mainly from academic references, eGovernment factsheets, and reports [69] [70] [96] of national policies and initiatives.

5.1.1.2.1 Assessment Methodology

The assessment methodology for the findings is mainly based on the following criteria:

- 1) The incorporation in the NIF of new Greek and European legislation that affects interoperability;

- 2) The compliance among the NIF and EIF, considering the principles of the latest version of EIF v3 and the EIF strategy;
- 3) The Tallinn Declaration on e-government (due to the fact that it was signed by the Greek Government for implementation);
- 4) Proposals, initiatives and other technological trends.

The proposals are combined in a list according to the EIF layers (Legal, Organisational, Technical, and Semantic), along with other factors that should be taken into consideration such as educational specifications for the support of the Framework.

5.2 Findings

The Greek NIF was published in 2008, even before EIF v2, and although the percentage of alignment with it is very high, the implementation – on the contrary – is quite behind. The Framework goes hand-in-hand with the main components of EIF v2 – being in advance of its time; still, there was no systematic process for its updating to fit the current EIF v3 and, as a result, a plethora of new initiatives and aspects were not included although, in some cases, these were introduced in the Greek Legislation. Another interesting fact is that although, as mentioned, there was a Ministerial decision and a law, the rate of its implementation by Public Administrations was – and still is – very low, which leads to conclude that more concrete measures for its implementation are needed. In addition, several findings were reused from citation [90], “*N.Vogiatzis, Questionnaire for the self-assessment of the Competent Authorities for the implementation of the Interoperability Framework: The 50 Major Municipalities, 2016*”. The basic structure of the framework (Figure 22) is well advanced as it was mentioned earlier, updates and recommendations should be merely made to the new technological trends and legislation/

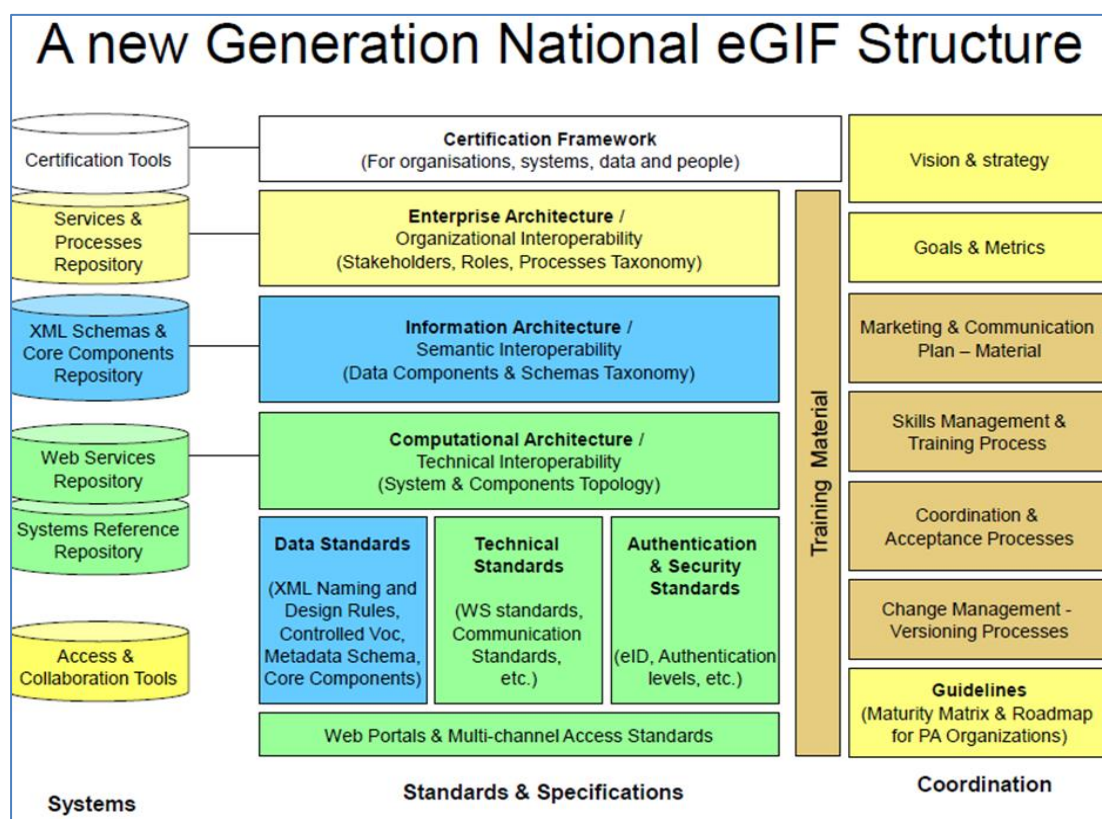


Figure 22: proposal for new egif structure (extracted from Lecture Notes of egif course)

5.2.1. Findings of the Assessment Criteria

In the following sections, the main assessment criteria are set in categories and further analysed. Some categories are described in the same chapter for consistency. For example, the Legislation includes national and European Legislation, the comparison with EIF v3 includes a holistic approach not per EIF recommendation but per basic principles, and combines partially the legislative status.

5.2.1.1 Legislation and eGIF

The most important legislative acts that affect interoperability and need to be included in the next generation of eGIF are the following:

- Include the concepts of the federated identity that are introduced by the eIDAS regulation (EU/2014/910). These concepts have been introduced in article 10 of Law 4325/2015 (Government Gazette 47/A/2015) without putting emphasis on the cross-border dimension of the eIDAS regulation;
- The reuse of public sector information incorporating the ‘open by default’ principle that was introduced in Law 4305/2014. The Greek NIF does not provide any specific guidelines or recommendations for open data;
- Adaptation to the General Data Protection Regulation (GDPR) of the European Union by performing necessary changes. Applying the concepts of the General Data Protection Regulation (EU/2016/679) and, especially, the requirements for tracking personal data processing and the right for erasure i.e., right to be forgotten;
- The Digital Single Gateway regulation (EU/2018/1724) and, especially, the provisions for the cross-border access to online procedures, the automatic exchange of evidence considering the once only principle;
- Align with the European Commission Directives that enter into force after the publication of the Framework.

5.2.1.2 EIF v3 and eGIF

In the latest version of the Greek NIFO factsheet of 2015 [92], the compliance with previous the version of EIF had an interesting result as is visualised in Figure 23. Although the level of alignment was very high, the actual implementation was very low. Taken into account the analysis performed in the factsheet, an attempt for a more thorough research is performed in this article.

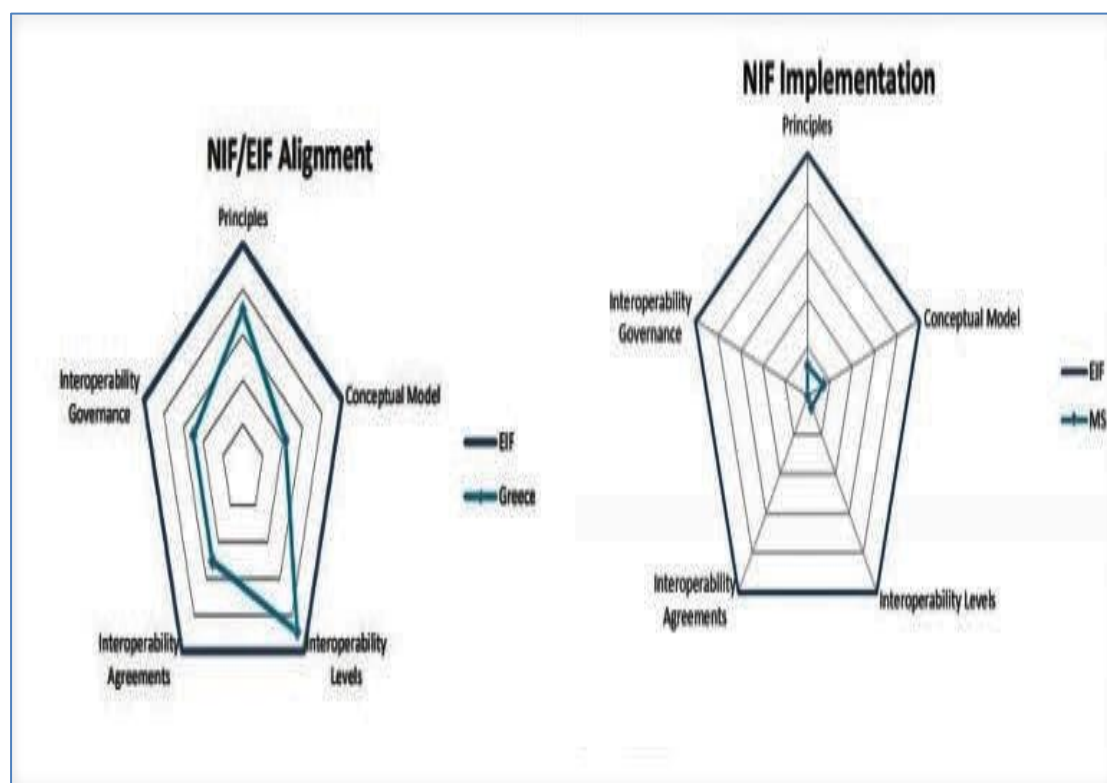


Figure 23: eGIF Alignment and Implementation with EIF v2 (Source: Greek eGov NIFO Factsheet)

Figure 24: eGIF Alignment and Implementation with EIF v2

The Greek NIF has provisions that are of common practice regarding the principles of User Centricity mainly due to the provisions law 3979/2011, and of Inclusion and Accessibility due to the same law (3979/2011). The provisions of the Greek NIF ministerial decision ensures compliance in the following principles of EIF:

- 1) Transparency;
- 2) Reusability;
- 3) Conceptual model of the components of a public service proposed in EIF;
- 4) Interoperability layers as proposed by EIF i.e., Legal interoperability, Organisational interoperability and business process alignment, Semantic interoperability, and Technical interoperability.

Last, but not least, the Greek NIF supports the interoperability agreements among the public sector bodies. Regarding Multilingualism the Greek NIF provides the option for having more than one language in the services but this is not mandatory, therefore this EIF principle is being implemented only partially. The administrative simplification of the processes is implied in the Greek NIF but is not referred explicitly. The Greek NIF defines the role of Business Manager without setting the simplification of the processes as a prerequisite. Nevertheless, there are other documents, such as the Strategy of the Administrative Reform in the public sector 2017-2019⁵¹, that promotes the simplification as a main axis of the reform. The Ministerial Decision of the Greek NIF does not highlight the preservation of information. Nevertheless, the Presidential Decree 25/2014 (Government Gazette 44/A/2014) regulates the issues concerning the creation and management of electronic archives, as well as the digitisation of existing

⁵¹ Greek Strategy of the Administrative Reform in the public sector 2017-2019 (<http://minadmin.yypes.gr/?p=28284>)

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articles. The Greek NIF recommends that public sector bodies should ensure that others could maintain a system – regardless of whether they participated in the implementation of the system. In this regard, the technological neutrality and adaptability is implied, although not explicitly refereed. Although the Greek NIF is proposing the Service Oriented Architecture as the main option for the implementation of IT systems and e-services, it has not yet proposed any architecture that is agreed among the public sector bodies. Regarding the establishment of cross-sectoral interoperability communities, the Greek NIF and the governance of the Framework does not provide any specific detail on how this will be organised. Therefore, although the Competent Authority has been assigned, it does not provide details for the governance:

- 5) Currently the Greek NIF does not encourage the principles of Subsidiarity and Proportionality;
- 6) An infrastructure for a loosely coupled service component;
- 7) Definition and reuse of authentic sources of information;
- 8) Participation of public bodies in standardisation works.

The responsible authority for the Greek NIF did not monitor the implementation of the Greek NIF to provide guidelines on specific issues. Consequently, although in many legal documents and projects, specifications regarding the requirement for compliance with the Greek NIF was requested, in practice the compliance was applied on a voluntarily basis from Public Administrations.

5.2.1.2.3 Tallinn eGovernment Ministerial Declaration and eGIF

The Greek NIF Generally supports the guideline of the Tallinn Declaration apart from the following principles:

- Digital by default;
- Once only principle;
- Interoperability by default.

5.2.1.2.4 Proposals, Initiatives and other technological trends

In this section, an effort to combine proposals from different sources such as studies, solutions, initiatives and technological trends is described:

1. A proposal for the update of the Conformance Checklist of the e-Government Interoperability Framework for public Administrations, is the use of the open source tool ‘E-Governance Framework - Evaluation and Certification Tool’ [91] that was created by a student of the Digital Governance Research Centre (DGRC) with the use of open standards and the W3C evaluation toolkit. This can be an entry point to the update of the checklist for the next generation of the Framework and can evaluate the compliance of Public Services.
2. The Conformance checklist and/or other main components of the Framework can be combined with already mature interoperable solutions without having the need to reinvent a new tool for the compliance with the next generation of eGIF. Below are some examples of reusable tools that are being developed by the European Commission’s Interoperability unit – ISA²:
 - a. The Interoperability Maturity Assessment of a Public Service (IMAPS) tool to be more accurate and in accordance with European standards. IMAPS provides Public Administrations with an insight into two key aspects of their interoperability performance: the current interoperability maturity level of a

Digital Public Service, and the Improvement priorities to reach the next level of interoperability maturity [97]. Moreover, the previous version of IMAPS (IMM) was used by the Greek Public Administration to evaluate a number of public services provided at national and local level; this evaluation was performed by EKKDA⁵² as a training course.

- b. The Common Assessment Method for Standards and Specifications (CAMSS) is a method for the assessment of ICT standards and specifications to achieve interoperability and avoid vendor lock-in. The criteria evaluate the openness of standards and specifications and the tools are flexible and can be adapted to suit the needs of an individual Member State [98].
 - c. The European Interoperability Reference Architecture and Cartography tool (EIRA), classifies and organises building blocks relevant to interoperability, which are used in the delivery of digital public services, helps facilitate interoperability and reuse when developing public services. The tool is aligned with EIF via the (EIRA Metamodel viewpoint and Key Interoperability Enablers viewpoint), and with the EU General Data Protection Regulation (GDPR), introducing the Interoperability Privacy viewpoint [99].
3. The Greek NIF should take into account also the European Commission CEF building blocks (BBs). The basis for the CEF building blocks are interoperability agreements between European Union Member States. The CEF BBs offer basic capabilities that can be used to facilitate the delivery of digital public services across borders. The CEF interoperability components are the: Context Broker, eArchiving, eDelivery, eID, eInvoicing, eSignature and eTranslation [61]. With the CEF BBs defined at the National level, specific interoperability components can be defined in order to exploit the legacy systems of the Greek public sector [42].
 4. Other aspects for new technological trends such as Internet of Things (IoT), Artificial Intelligence (AI), text mining and data mining, linked data and blockchain technologies can be implemented in the recommendations of the Framework. In this context – though not a new technology – social media guidance should be implemented for Public Administrations as part of the Framework, not only because they are a major trend, but also because they provide an extra way for citizens to contact Public Administrations. Technological trends are ever-changing and can become very quickly obsolete; an attempt is made here to map them as recommendations according to the levels of EIF.
 5. The legal aspect is not mentioned again since there was an in depth analysis further above.
 6. Organisational Interoperability (to follow the European Union services): The requirements for pan-European eGovernment services should be jointly determined by the participating administrations via a demand driven approach (example: the 20 core services of eEurope service map). Define Business Interoperability Interfaces (BII) through which their business processes will be able to interoperate. For Semantics: develop common Data Dictionaries and common XML templates for Public Documents and exchange information taking into account the agreed core eGovernment data elements.

⁵² National Center of Public Administration and Local Government (EKDDA) Training Institute, library of educational material for the Interoperability Maturity Assessment for Public Services (<http://resources.ekdd.gr/gnosis/>).

7. Technical Interoperability: Establish a uniform way for web services, the implementation and orchestration should be a prerequisite. At front-office level, technical interoperability aspects should be considered for the following fields:

Data presentation and exchange, Accessibility, Interface design principles, Multi-channel access, Character sets, Collective authoring, File type and document formats, and File compression. At back-office level, Data integration and middleware, XML based standards, EDI-based standards, Web Services, Distributed Application Architecture, Interconnection services, File and message transfer protocols, Message transport and security, Message store services, Mailbox access, Directory and domain name services, Network services (consider all security aspects on all layers), Security services, General security services, PKI, Web service security, Firewalls, Protection against viruses, worms, Trojan horses and e-mail bombs.

5.2.1.2.5 eGIF Gap Analysis in Greek Municipalities

The quantitative survey [90] was conducted in May 2016 to examine the extent in which the eGovernment Framework is being implemented in the 50 largest municipalities in the country. The responses came from 38.5% (5 of 13 municipalities) of Attica, 23.1% (3) of Central Macedonia, 7.7% (1) of Western Macedonia, 7.7% (1) of North Aegean Region, 7.7% (1) of Region of Eastern Macedonia Thrace, 7.7% (1) of Region of Central Greece and 7.7% (1) of Region of Crete (Figure 25).



Figure 25: Responses from Greek Municipalities in 2016 [90]

The results showed that although the majority of participants were officials from departments and Directorates of IT departments, they were familiar with eGIF due to their personal interest in it, and not via their organisation's. In the more technical questions, the answers were either negative for the implementation of eGIF or the participants were unaware of them. The reasons for this were 90.9% and 63.6%, respectively – (45% attributable to a lack of training). Another interesting fact is the minor percentage compliance with eGIF from the results (Figure 26).

Therefore, a great deal of effort must be made for training and raising awareness so that the implementation of eGIF can be performed.

Μικρότερη συμμόρφωση				
a/a	Ερώτηση	NAI (%)	OXI (%)	ΔΕΝ ΓΝΩΡΙΖΩ (%)
3.17	Για τις σημασιολογικές απεικονίσεις (οντολογίες) χρησιμοποιείτε το πρότυπο απεικόνισης OWL (Web Ontology Language);	0	53,8	46,2
3.16	Για την περιγραφή των μεταδομένων των ιστοσελίδων των υπηρεσιών και των εγγράφων χρησιμοποιείτε το πρότυπο Dublin Core;	0	46,2	53,8
3.14	Εφαρμόζετε κάποια μέθοδο μοντελοποίησης υπηρεσιών ή διαδικασιών όπως BPMN ή UML;	0	46,2	53,8
3.7	Για κάθε ηλεκτρονική υπηρεσία που παρέχεται από τον φορέα σας υπάρχει λεπτομερής αποτύπωση της ροής εργασιών, η διαγραμματική της απεικόνιση, η συμπλήρωση των κατάλληλων μεταδομένων και η περιγραφή των εγγράφων που απαιτούνται για την ολοκλήρωσή της, σύμφωνα με τις απαιτήσεις του Πλαισίου Διαλειτουργικότητας;	7,7	69,2	23,1
3.15	Για την περιγραφή της δομής των δεδομένων χρησιμοποιείτε σχήματα XML (XML schemas) που συμμορφώνονται με την προδιαγραφή XML Schema Definition (XSD) v1.0;	7,7	38,5	53,8
3.9	Έχει οριστεί στέλεχος του φορέα σας ως Επιχειρησιακός Υπεύθυνος για κάθε ηλεκτρονική υπηρεσία που παρέχεται από τον φορέα προς πολίτες επιχειρήσεις ή άλλους φορείς;	15,4	76,9	7,7

Figure 26: Example of results for the compliance with eGIF [90]

5.2.2. List of proposals for eGIF

Considering the factors that were already identified in the previous sections, the following list, was created to sort the main recommendations for the evaluation of the Greek NIF, thus proposing a basis on which the necessary actions can be performed. The list classifies the recommendations to the four layers of EIF (Legal, Organisational, Semantic, Technical) that consist the holistic approach of the Interoperability Governance of EIF, and which are part of its Integrated Public Service Governance model. The list has a concrete numbering starting from the first category that is most affected by the recommendations, because this makes it also easier to insert the recommendation in the other categories (an example is the once-only principle, which for it to be accomplished requires changes in the Legal, Organisational and Technical levels, but not in the Semantic level). The proposals are gathered in Table 1. The recommendations are categorised according to one of the four (4) layers of EIF and further to other recommendations that are apart from the layers. The categorisation starts with the initials of the layers, L=Legal, O=Organisational, S=Semantic, T= Technical and adds a number. The recommendations that belong to the Others category are indicated only with a number. There are recommendations that fit into more areas other than the one that are described in; in such cases, they are set below the ones that belong to the original category in a highlighted colour. The next table presents the recommendations per proposed area for update.

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Table 1: List of Recommendations for eGIF v2

Legal
L.1 Incorporating the provisions of the newly adopted legislation in the Greek NIF, by providing specific guidelines and recommendations for the implementation. Provision for European Directives must be also incorporated. L.2. Setting up the governance model taking into account the provision of the new law 4623/2019 (Government Gazette 134/A/2019) and especially the Coordination Committee for the Digital Transformation of Article 35. The members of this Committee are mainly the managers in the specific Ministries responsible for the digital transformation. L.2.1. In this regard, sectoral interoperability sub-teams should be established for handling the specific topics of interoperability. L.3. Establishment of Legal and Organisational Agreements among the simplification procedures and interoperability. The activities of the new proposed programme for the simplification of procedures should take interoperability as a prerequisite⁵³. T.1
Organisational
O.1. Providing the appropriate resources for the co-ordination, organisation and monitoring of interoperability to the responsible organisation in Greece (currently the Ministry of Digital Governance). O.2. Follow the European Union services: The requirements for pan-European eGovernment services should be jointly determined by the participating administrations via a demand-driven approach. O.3. Define Business Interoperability Interfaces (BII) through which their business processes will be able to interoperate. L.2.1 L.3
Technical

⁵³Public Consultation for simplification of procedures, Αναπτυξιακό Πολυνομοσχέδιο κεφ.Γ. Άρθρο 42 – Εθνικό Πρόγραμμα Απλούστευσης Διαδικασιών <http://www.opengov.gr/ypoian/?p=10450>

T.1. Specific architectures for eID, Trust services and Once-Only Principle, should be defined in the context of the Greek NIF. Based on the 'Once-Only' principle, i.e. the principle that "information and data submitted to public authorities need not be submitted again, since data submitted to a Body may be derived from another", for each Public Sector Authority (PSA) has the responsibility to maintain its data and to make it available via online services to other Public Sector Authorities (PSAs).

T.2. The Greek NIF should take into account the interoperability components that have been developed by the European Commission, like the CEF Building Blocks (such as Context Broker, eArchiving, eDelivery, eID, eInvoicing, eSignature and eTranslation) and define at National level specific interoperability components that exploit the legacy systems of the Greek public sector.

T.3 Establishing a common procedure for web services implementation and orchestration should be a prerequisite.

T.4. At the front-office level, technical interoperability aspects should be considered for the following fields: Data presentation and exchange, Accessibility, Interface design principles, Multi-channel access, Character sets, Collective authoring, File type and document formats, and File compression.

T.5. At the back-office level, technical interoperability aspects should be considered for the following fields: Data integration and middleware, XML⁵⁴-based standards, EDI-based standards⁵⁵, Web Services, Distributed Application Architecture, Interconnection services, File and message transfer protocols, Message transport and security, Message store services, Mailbox access, Directory and domain name services, and Network services.

T.6. Consider all Security aspects for all layers: Security services, General security services, PKI⁵⁶, Web service security, Firewalls, Protection against viruses, worms, Trojan horses and e-mail bombs.

Semantics

S.1. Develop common Data Dictionaries.

S.2. Develop common XML templates for Public Documents and exchanged information taking into account the agreed core eGovernment data.

T.1.

Others

⁵⁴ XML Extensible Markup Language: <https://www.w3.org/standards/xml/>

⁵⁵ EDI Electronic data interchange: https://docs.oracle.com/cd/E51433_01/fscm92pbr2/eng/fscm/sedi/task_EDIStandards-9f1203.html

⁵⁶ PKI Public key infrastructure is a technology for authenticating users and devices in the digital world: <https://www.ssh.com/pki>

1. Education and training is essential not only for interoperability issues but also for minimising the risk of resistance to change that will come when a new Framework needs to be implemented. This should be provided not only as a regulation that has to be adopted, but also with active participation in courses and with the provision of the supporting educational documents such as the MOOCs⁵⁷ and/or Open Educational Resources. An example of an online course is the Interoperability in eHealth.
2. Update the Conformance Checklist of the e-Government Interoperability Framework for Public Administrations, with the use of the open source tool 'E-Governance Framework - Evaluation and Certification Tool' [3] that was created under the scope of Digital Governance Research Centre (DGRC)⁵⁸.
3. Reuse interoperable ISA² and CEF tools such as EIRA, IMAPS, CAMSS, IQAT eTranslation, Context Broker, eDelivery.
4. Include recommendations for Internet of things (IoT), Artificial Intelligence (AI), text mining and data mining, linked data and blockchain technologies that can be implemented by Public Administrations.
5. Include guidance for social media usage.

⁵⁷ MOOC, Massive Open Source Online Course is a model for delivering learning content online to any person who wants to take a course, with no limit on attendance: <https://library.educause.edu/topics/teaching-and-learning/massive-open-online-course-mooc>

⁵⁸ DGRC, Digital Governance Research Centre is an institution of study, education, planning and implementing support modern approaches and methodologies for governance at local, national and international level: <http://www.dgrc.gr/en/>

6. Questionnaire for the proposed new eGov Framework

6.1 Short Description

The purpose of this questionnaire was to assess and evaluate the update of eGIF. Input was taken from the results of article: “Kalogirou V., Stasis A., Charalabidis Y., *Adapting National Interoperability Frameworks beyond EIF 3.0: The case of Greece*” [2] that will be presented in ICEGOV2020. The suggestions for updating the Framework of part IV resulted from the outcomes of the afore-mentioned article after some customisation to fit a questionnaire.

In addition, the methodology and certain questions for parts II and III were reused for the current questionnaire from the work done in the thesis “N.Vogiatzis, *Questionnaire for the self-assessment of the Competent Authorities for the implementation of the Interoperability Framework: The 50 Major Municipalities, 2016*” [81]. An online survey was designed with EC’s EUSurvey⁵⁹ tool to support the questionnaire in the Greek language, available at the following public link: <https://ec.europa.eu/eusurvey/runner/eGIFSurvey>. The full questionnaire in the Greek language is available in Annex II. Questionnaire in Greek Language- Ελληνική Έκδοση.

6.2 Structure of the Questionnaire

The questionnaire (including the original, Greek language version) – apart from the title, disclaimer and description – consists of four (4) sections: I) Personal information, II) General information, III) Implementation of the Framework IV) Recommendations for updating.

SECTION I: PERSONAL INFORMATION

I. First Name and Last Name

II. E-mail address

III. Would you like to be informed about future actions on the Framework for interoperability by the University of the Aegean and the Research Centre on eGovernment for Research Activities?

YES

NO

SECTION II: GENERAL INFORMATION

1. What is the Institution that employs you?

Central Body

Independent Authority

NSF

Region

Municipality

Other.....

2. What is your position?

Director of the Informatics Directorate

Head of the Department of Informatics

Informatics Officer

• Other.....

⁵⁹ EUSurvey: <https://ec.europa.eu/eusurvey/home/welcome>

3. Are you aware of the content of the e-Government Service Framework (Government Gazette, Series II, No 1301/B/12-04-2012) and, if you are, how were you informed about it? (http://www.et.gr/idoys-nph/search/pdfViewerForm.html?args=5C7QrtC22wEbA_BZxkczbHdtvSoClrL8t41p22kte0Et_iDow6HlTE-JInJ48_97uHrMts-zFzeyCiBSQOpYnTy36MacmUFCx2ppFvBej56Mmc8Qdb8ZfRJqZnsIAdk8Lv_e6czmhEembNmZCMxLMtcT-tYyepU1Eoc2VJ5j7LtROwoBjjL-iaf-bgRlbFKFH)

No

Circulars from Official communications from the Ministry of the Interior

Yes, from Ministry site

Yes, from a personal inquiry

Other

SECTION III: IMPLEMENTATION

4. Do you consider that the web page of your organisation is in compliance with the Framework?

Yes

No

Don't know

5. Are key personnel assigned to your organisation for its website roles: Auditor, Technical Manager & Content Manager?

Auditor Yes / No

Technical Manager Yes / No

Content Manager Yes / No

6. Is it supported by a legal advisor to the Administration, who adequately controls the legal issues arising in the provision of eGovernment services such as the management of personal data?

Yes

No

Don't know

7. Has the exact name of your web page identification been approved by the National Telecommunications and Post Commission, and is it in line with the "Rules on the Management and Registration of Areas.gr" of EETT?

Yes

No

Don't know

8. According to the Framework, operators MUST request domain names which are according to their official name. Does this apply to your organisation?

Yes

No, but will happen

No

9. Is there a clear procedure for the publication of content and services through the Framework, both for the initial publication and for maintenance, and with the involvement of the appropriate roles?

Yes

No

Don't know

10. Do you backup your files, and if you do, how often?

No

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Yes, every day
Yes, every other day
Yes, every week
Yes, every month
Yes, at irregular intervals

11. Are the information material and services provided through the web page of your organisation classified in representative categories belonging to the current list of government categories list (GCL)? (<http://www.yap.gov.gr/images/stories/Plaisio/GCL-v4.0.PDF>)

Yes
No
Don't know

12. Has your organisation been working on registering your web page with search engines (e.g. Google, Yahoo)?

Yes
No
Don't know

13. Does your administration comply with the Web Content Accessibility Guidelines (WCAG) standard instructions, version 2.0, at a compliance level of at least compliance "AA" so that all groups of people have access to content and services across the board? (<https://www.w3.org/TR/WCAG20/>)

Yes, at "AA" level
Yes, at "AAA" level
No
Don't know

14. During the development phase of your organisation's webpage, which of the following audits were carried out using tools or services proposed by W3C? (<https://www.w3.org/Status.html>)

Check compliance of the HTML version of the web pages in line with W3C standards
Validation of the correct use of Cascading Style Sheets (CSS)
Quality, accessibility and privacy checks of the content of the website's pages
None of the above checks were carried out
Don't know

15. The webpage provide information to users via:

Newsletter
RSS
Forum
Social Media

16. Does the webpage provide the possibility for users to evaluate the information or services provided?

Yes, through multi-choice options
Yes, with feedback via email and/or general contact form
Yes, through an institutionalised procedure to assess the webpage's operation
No
Other

17. Is there a policy clearly defined and adopted by the Administration for the safety of your webpage?

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No

Yes

Yes, and it is part of the Administration's approved security policy

18. Do you, or a service contractor, host the webpage?

Hosted on our servers

Servers of SYZEFXIS

Hosted by a service contractor

19. If the webpage is hosted by a series of servers, are they in a dedicated computer room?

No

Yes

19a. If yes, what of the following is available in the computer room?

Fire detection and fire suppression system

False ceiling

Raised floor

Electronic system for controlled access

Generator in case of interruption of normal power supply

Are not located in a specially adapted place

20. What is the level of electronic services according to the following indicators provided by your Administration?

According to indicators monitored at European level 2, the degree of provision of an electronic government service through an electronic governance system is escalated into four levels:

- *Level 1: Information — Publication (Information). Full coverage of the need to inform the citizen about the provision of services through information material and instructions that are publicly available on the Body Portal.*
- *Level 2: Interaction — Interaction. Making available on the Web Portal the official forms in a printable format in order to start the service process. The procedure is done manually.*
- *Level 3: Two-way interaction. Access via the Body Portal to official online forms in order to start the service process. The procedure may also include the certification of the user of the service. Completion of the service procedure shall be carried out manually.*
- *Level 4: Transaction. Online materials and information systems of the organisation that offer the citizen a complete electronic management of the service, including complex tasks such as certification, decision, notice, delivery and payment (if necessary). No additional work is required from the citizen to complete the service.*

Level 1

Level 2

Level 3

Level 4

21. What are the methods to authenticate users?

No need for authentication

Passwords

Single sign-on

Soft storage passwords

Hard storage badges

Taxisnet

22. In order to promote the webpage or any new electronic service, have you used any of the following instruments? (0-4 answers)

Television
Radio
Printed promotional brochures
High-visiting web pages
Nothing was used
Other

23. Do you keep the records of transactions in log files so that they can be confirmed?

Yes
No
Don't know

24. Are the system(s) of storage of the content and data of the electronic services different from the "web server" system?

Yes
No
Don't know

25. In the case of the provision of electronic services, are the requirements of Law N.2472/1997 on the collection, use, storage and protection of personal data fulfilled by your operator?

No personal data are collected
The requirements of the Act are complied
Requirements not yet met
Don't know

25a. If the answer to the previous question is yes, during the provision of electronic services by your organisation, is there a categorisation of the data which the service provider uses/processes, in personal, sensitive, economic data?

Yes
No
Don't know

26. For each electronic service provided by your organisation, is there a detailed mapping of the workflow, the visualisation, the completion of the appropriate metadata and the description of the documents needed to complete it in accordance with the requirements of the Interoperability Framework?

Yes
No
Don't know

27. Has a process re-engineering for a service provided by your organisation been done, to make it more effective and efficient?

Yes
No
Don't know

28. Is a manager of your organisation appointed as an operational officer responsible for any electronic service provided by the organisation to citizens, businesses or other bodies?

Yes
No

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Don't know

29. Is there interoperability of applications from your webpage with other central websites such as DIAVGEIA, e-procurement or GGPS or webpages from any other entity?

No

Don't know

Yes

30. Does your organisation provide a complex service in partnership with other actors in the Public Administration, with the aim of providing one-stop digital services?

Yes

No

Don't know

31. If the answer is yes, have you concluded agreements with other public bodies on the conditions of cooperation, with the ultimate aim of providing better services to the recipients?

Yes

No

Don't know

32. Is it possible to conduct financial electronic transactions through the webpage of your organisation?

Yes

No

Don't know

33. Are the metadata of the webpage's contents registered in accordance with the standards and specifications of the relevant Annex of the Framework?

Yes

Yes, and can be exported in XML format for use by other webpages

No

Don't know

34. Do you apply a service modelling methodology such as BPMN or UML?

Yes

No

Don't know

35. For the description of the data structure, do you use XML schemas that comply with the XML Schema Definition (XSD) specification v1.0?

Yes

No

Don't know

36. Is the Dublin Core model used to describe the metadata pages of the services and documents?

Yes

No

Don't know

37. For semantic ontologies do you use the OWL model (Web Ontology Language)?

Yes

No
Don't know

38. Do you use or develop an Open Source software or software for services provided by your organisation, for the back-office (e.g. protocol, application of a population register, application to the financial service, etc.)?

Only office applications (e.g. LibreOffice)

Use a few for the back-office

Our organisation is developing Open Source software to support the back-office

Open Source Software will be used soon

No

Other

39. Does your operator have an open data policy (Disclosure of data useful to citizens, businesses, other public bodies (<http://www.data.gov.gr/>)?)

Yes

No

Don't know

40. If the majority of the above replies were negative, what do you consider to be the reason(s)? (multiple answers possible)

Lack of time

Lack of information on the eGovernment Framework

Lack of staff

Lack of training by EKDDA

Other

SECTION IV) RECOMMENDATIONS FOR UPDATING LEGAL RECOMMENDATIONS

1. Do you consider that the newly adopted Greek legislation applies in the Framework?

- Yes
- No
- Don't know
- If you replied **no**, can you provide examples?

2. Do you consider that the European Directives are applied in the Framework?

- Yes
- No
- Don't know
- If you replied **no**, can you provide examples?

3. Do you propose any other specific legal guidelines and recommendations for the update of the Framework?

- Yes
- No
- Don't know
- If you replied **yes**, can you provide examples?

4. Do you know any governance model that could apply to the Framework?

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- Yes
 - No
 - Don't know
 - If you replied **no**, can you provide suggestions?
5. **In this regard, do you know any sectoral interoperability sub-teams for handling the specific topics of interoperability?**
- Yes
 - No
 - Don't know
 - If you replied **yes**, can you provide examples?
6. **Do you believe it is important to create such teams?**
- Yes
 - No
 - Don't know
7. **Do you know any Legal and Organisational Agreements among the simplification procedures and interoperability? For example, the activities of the newly proposed programme for the simplification of procedures.**
- Yes
 - No
 - Don't know
 - If you replied **yes**, can you provide examples?

ORGANISATIONAL

8. **Can you provide examples of appropriate resources for the co-ordination, organisation and monitoring of interoperability?**
- Yes
 - No
 - Don't know
 - If you replied **yes**, can you provide examples?
9. **Do you consider important to follow and monitor the European Union services approach? For example, for the alignment and implementation with other National interoperability Frameworks. (Rate from 1 to 5)**
1. Extremely
 2. Very
 3. Moderately
 4. Slightly
 5. Not at all
10. **Do you know any Business Interoperability Interfaces (BII) through which their business processes will be able to interoperate?**
- Yes
 - No
 - Don't know
 - If you replied **yes**, can you provide examples?

TECHNICAL

11. How important are the Specific architectures for eID, Trust services and Once-Only Principle, in the context of the Greek NIF? (Rate from 1 to 5)

Based on the 'Once-Only' principle, i.e. the principle that "information and data submitted to public authorities need not be submitted again, since data submitted to a Body may be derived from another", for each Public Sector Authority (PSA) has the responsibility to maintain its data and to make it available via online services to other Public Sector Authorities (PSAs).

1. Extremely
2. Very
3. Moderately
4. Slightly
5. Not at all

12. Do you consider that the Greek NIF should take into consideration the interoperability components that have been developed by the European Commission, like the CEF Building Blocks (such as Context Broker, eArchiving, eDelivery, eID, eInvoicing, eSignature and eTranslation) and define at National level specific interoperability components that exploit the legacy systems of the Greek public sector? (Rate from 1 to 5)

1. Extremely
2. Very
3. Moderately
4. Slightly
5. Not at all

13. Can you list which solutions of ISA² (https://ec.europa.eu/isa2/solutions_en) and CEF (<https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/CEF+Digital+Home>) must be reused and why? (Such as EIRA, IMAPS, CAMSS, IQAT eTranslation, Context Broker, eDelivery etc).

14. Establishing a common procedure for web services implementation and orchestration should be a prerequisite?

- Yes
- No
- Don't know

15. At the front-office level, what are the technical interoperability aspects that should be considered for the following fields:

1. Data presentation and exchange
2. Accessibility,
3. Interface design principles
4. Multi-channel access
5. Character sets
6. Collective authoring
7. File type and document formats, and file compression
8. Other?
9. Don't know

16. At the back-office level, what are the technical interoperability aspects that should be considered for the following fields:

1. Data integration and middleware
2. XML-based standards
3. EDI-based standards
4. Web Services
5. Distributed Application Architecture
6. Interconnection services
7. File and message transfer protocols
8. Message transport and security
9. Message store services
10. Mailbox access
11. Directory and domain name services
12. Network services
13. Other
14. Don't know

17. What are the security aspects that should be considered?

1. Security services
2. General security services
3. PKI
4. Web service security
5. Firewalls
6. Protection against viruses
7. Worms
8. Trojan horses
9. e-mail bombs
10. Other
11. Don't know

SEMANTICAL

18. What common Data Dictionaries should be developed?

19. What are the core vocabularies that you would like to implement?

20. What are the common XML templates for Public Documents and exchanged information taking into account the agreed core eGovernment data?

OTHER

21. Do you consider that education and training for interoperability should be obligatory?

- Yes
- No
- Don't know
- If you replied **yes**, can you specify why?

22. Which educational path do you prefer?

- Online course(s)

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- Participation in a class
- Both of the above
- Provision of supporting educational documents and Educational Resources
- All
- None

23. Do you consider a Conformance Checklist of the e-Government Interoperability Framework for Public Administrations necessary?

- Yes
- No
- Don't know
- If you replied **yes**, can you specify why?

24. Do you consider recommendations for Internet of things (IoT), Artificial Intelligence (AI), text mining and data mining, linked data and blockchain technologies that can be implemented by Public Administrations should be added in the Framework?

- Yes
- No
- Don't know
- If you replied **yes**, can you propose recommendations?

25. Do you consider the guidance for social media usage needs to be added in the Framework?

- Yes
- No
- Don't know
- If you replied **yes**, can you specify why and propose recommendations?

END OF QUESTIONNAIRE – Thank you for your responses

7. Conclusions

7.1 Review and Gap Analysis of the EIFs

As part of this research, in Part B only twelve (12) out of the forty-seven (47) recommendations were examined. A proposal for further work can be the study and comparison of all recommendations with more countries, and if there is an updated version of their NIFs, to replace the versions that were studied here. Most of the principles, which were initially stated in 2004 with EIF v1, are still relevant in 2017 for EIF. In addition, the majority of the identified interoperability problems remain unsolved or partially fixed. Each version of EIF may differ in text and style following the technological trends, but most of the guidance remains the same. In the next EIF versions the fast technological changes and trends in ICT should be taken into consideration, because these will not only introduce new technological problems that have to be coped with, but also impact the ones remaining. The ones that still exist need to be addressed by each country and should be considered as prerequisites for NIFs and, thus, for EIF. We need to eliminate digital barriers and ensure the success of DSM's goals of free movement of goods, persons, services and capital, along with fair access to online goods and services, so that isolation and fragmentation cannot hinder any more the full potential of interoperability; all this should be unlocked not only on a national level but across borders, too.

Proper and interoperable digitalisation of Public Administrations will offer better services to citizens and businesses and, thus, contribute to economic growth while making citizens' life easier. There is a need to regularly update EIFs and NIFs due to the rapid change of technological developments. The updates between EIFs took several years, and still there are MSs that currently have an outdated version of NIF that, in some cases, reaches back to EIF v1; this shows that the actual implementation has fallen behind and there is a need to address this issue at a European level, with the close collaboration of MSs. There is still the need for identifying the implementation of EIF in NIFs, and an alignment process that will reduce the gap between the actual measurements of interoperability in each MS' PAs. Furthermore, there are gaps between the readiness in reaching new trends and being on track with current Frameworks in MSs. The alignment is a first step to having concrete results based on the actual implementation and monitoring. Although in some cases this was easy to conclude, in other the result was ambiguous due to the difference in the outcome and the Framework schemes in each country. A combination of the NIFO Analytical Model and of IMAPS can perhaps adhere value to monitor MSs' implementation by monitoring public services provided at a national and local level, which have the maturity for cross-borders and cross-sector eGov services, along with an stable EU mechanism such as a directive to ensure the implementation in each MS.

7.2 eGIF Review

eGIF is the National Interoperability Framework for Greece since 2007. In this article, apart from the literature review, the historic references and structure of the Framework, an effort for recommendations for its update is made. It is considered a cornerstone, along with EIF v3, and further with the current technological trends and the associated Greek and European Legislations. This means that since technology is advancing too fast and the demand for digital services is continually increasing, immediate action for its update is needed. Concrete steps, without further ado, to rebuild and update it accordingly to the current – and possible future – technological trends, having EIF as a basis for the structure, but to also impose a legal obligation for its implementation by the Public Competent Authority in practice. Additionally, parallel measures for its sustainability and continuous reform in suitable time intervals must be ensured, in order to avoid repeating the gap that currently exists for more than twelve years in Greek Public Administrations (from 2008 as a legal act up to 2019). Furthermore, a proposed suggestion that falls out of the scope of this article, but can aid the actual implementation of eGIF is the creation of a Digital National Strategic Plan. The plan will align and implement Digitalisation of the country ensuring digital public innovation, sustainable growth and competitiveness, thus revitalising the economy. The plan will have to harmonise accordingly

the National Digital Strategy, the digital and/or eGovernment Action Plan, the operational programmes such as ESPA, the research, technological, development and innovation programmes, both sectoral and regional programme levels, and any other funding programmes and instruments, eGovernment actions and regulations that are relevant. Amendments to current legislation may be needed to accomplish the plan and to incorporate the EU-relevant directives in time.

The research is not exhaustive but provides a basis and structure for the update. Further work that will extend this research and propose a more concrete implementation plan with a specific timeframe in collaboration with the relevant competent Authorities is recommended.

7.3 Limitations

The lack of available data or recent measurable results led to the exclusion of different factors. Nonetheless, as part of this research there were good insights in the different causes of interoperability, thus allowing to contribute further to a common interoperability framework.

In the case of Greece, it was even harder to find information that is publicly available and required a lot of effort to find older versions of documents such as the versions regarding Digital and/or eGovernment strategies. Whenever there is a change in the titles of Hellenic Authorities – or a change in their jurisdiction – their history track or archives of old online files and documents are either difficult to locate or no-existent.

Indicative examples are the current Strategy⁶⁰ and the 2006 Strategy⁶¹.

There are no concrete steps for the implementation of a National Interoperability Framework from the Government in Greece, leading to the unavailability of solutions for updating and sustaining a Framework in practice, apart from academic research.

7.4 Reusable practices

Reusable practices can be considered, and the categorisation matrix that was made for the comparison of EIFs and NIFs can be reused for the update of the EIF or the NIF from Chapter 5. Moreover, some elements can be further elaborated on the proposed recommendations and the information that was gathered for the purpose of this study for the revision of eGIF. The research is not exhaustive but provides a basis and structure for the update. Further work that will extend this research and propose a more concrete implementation plan with a specific timeframe in collaboration with the relevant Competent Authorities is recommended.

7.5 Proposals for Next Steps

A lot has changed from the first programmes and initiatives that identified interoperability as a crucial factor for public digital services. According to the outcomes of this study the majority of the principles, which were initially stated in 2004 with EIF v1, are still relevant in 2017 for EIF. In addition, the majority of the identified interoperability problems remain unsolved or partially fixed. Each version of EIF may differ in text and style following the technological trends, but most of the guidance remains the same. Thus, there is a need to regularly update EIFs and NIFs due to the rapid change of technological developments. The updates between EIFs took several years, and still there are MSs that currently have an outdated version of NIF that, in some cases, reaches back to EIF v1; this shows that the actual implementation has fallen behind and there is a need to address this issue at a European level with close collaboration with MSs. There is still a need for identifying the implementation of EIF in NIFs and for an

⁶⁰ EGov strategy: http://www.minadmin.gov.gr/wp-content/uploads/20140415_egov_strategy.pdf

⁶¹ Digital strategy
http://www.infosoc.gr/NR/rdonlyres/A13F889F-DE92-4DCF-B64A-37351BFC69B9/3053/ktp_all.pdf

alignment process that reduces the gap between the actual measurements of interoperability in each MSs' PAs. Furthermore, there are gaps between the readiness in reaching new trends and being on track with current frameworks in each MS. The alignment is a first step in having concrete results based on the actual implementation and monitoring. Although in some cases it was easy to analyse them, in other cases the results were ambiguous due to the difference in the outcome and the Framework schemes used in each country. A combination of the NIFO Analytical Model and of IMAPS can perhaps adhere value to monitor each MS's implementation by monitoring public services provided at a national and local level, which have the maturity for cross-border and cross-sector eGov services, along with a stable EU mechanism such as a directive to ensure the implementation in each MS.

eGIF, the National Interoperability Framework for Greece since 2007, needs a revision using as a basis EIF v3, and taking into consideration the current technological trends and the associated Greek and European Legislations. Concrete steps, without further ado, to rebuild and update it accordingly to the current – and possible future – technological trends, having EIF as a basis for the structure, but to also impose a legal obligation for its implementation by the Public Competent Authorities. Additionally, measures for its sustainability and continuous reform, in suitable time intervals must be ensured in order to not repeat the gap that currently exists for more than twelve years in the Greek Public Administration.

Furthermore, a proposed suggestion that falls out of the scope of this article, but can aid the actual implementation of eGIF, is the creation of a Digital National Strategic Plan. The plan will align and implement Digitalisation of the country ensuring digital public innovation, sustainable growth and competitiveness, thus revitalising the economy. The plan will have to harmonise accordingly the National Digital Strategy, the digital and/or eGovernment Action Plan, the operational programmes such as ESPA, the research, technological, development and innovation programs, both at sectoral and regional programme-levels and, other funding programmes and instruments, eGovernment actions and regulations which are relevant. Amendments to current legislation may be needed to accomplish the plan and to incorporate the EU-relevant directives.

The adoption of the guidelines of eGIF will help to improve the level of security of the services provided by Public Administrations, allowing the improvement of the overall functioning of the Greek Public Administration. eGIF is an important element of the Greek Public Administration's strategy. By transitioning and adapting its services to the current needs, and by harmonising it with European policies and guidelines, it will become an important asset for the Greek Digital Public Administration of the new era.

This study could be further advanced in two directions: 1) update of eGIF, and 2) continuation on the history of Interoperability. Specifically:

- **eGIF:** A proposal for next steps is the continuation of this study with amendments obtained from the responses of a questionnaire that could be further elaborated and complement the proposals of Chapter 6 with new data and feedback.
- **History, Status and next steps in Interoperability:** This proposal is inspired from the elements of Figure 27 below, to continue and elaborate on international standards, industrial initiatives, assessment models, models and practices, infrastructures, and expand further the definitions and studied science tools and methods.

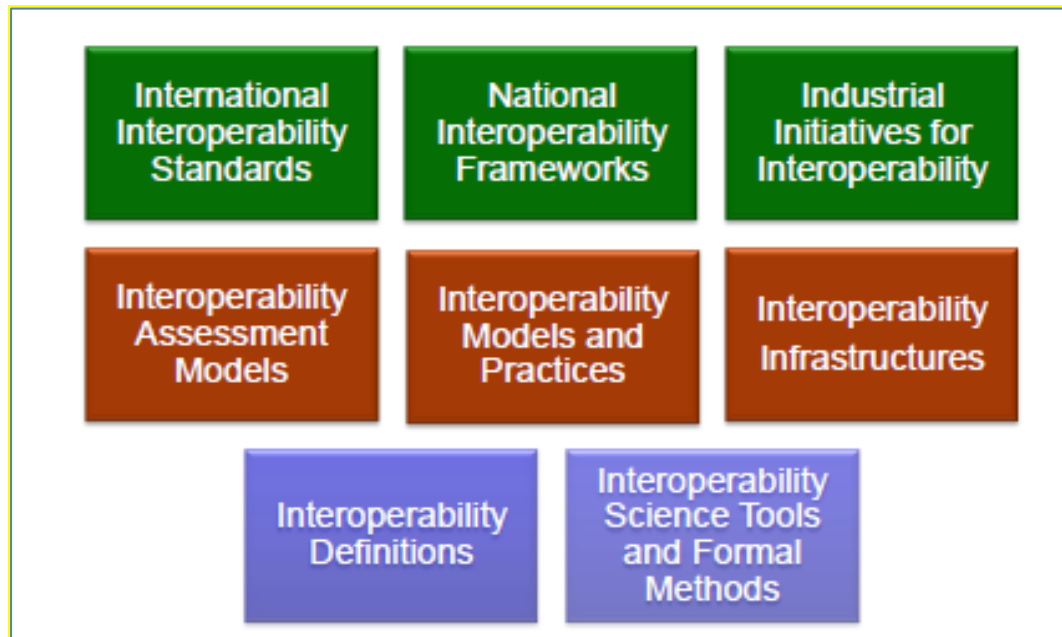


Figure 27: Next steps (Source: MSc course of EIF⁶²)

⁶² The image is extracted from the material of the course EIF of Aegean University

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9. ANNEX

I. Findings of comparison between EIFs and EIF v3 with NIFs

The results from the comparisons from Chapter 4 are presented here in Table 4, and Table 5. In addition, as an embedded file, Table 2, attached to this document is the Excel spreadsheet that was used for calculation, comparisons and charts.

Table 2: Embedded spreadsheet (for electronic version)



Table 3: EIF v3 categorisation of elements

EIF v.3 Categorisation for comparison				
	New EIF Recommendations (47)	Recommendations	Principles, Layers, Model	Principle categories
(P) Principles	R1.P1.C1	R1.Ensure that national interoperability frameworks and interoperability strategies are aligned with the EIF and, if needed, tailor and extend them to address the national context and needs	Principle 1: subsidiarity and proportionality	Category1:Principle setting the context for EU actions on interoperability
(P) Principles	R2.P2.C2	R2.Publish the data you own as open data unless certain restrictions apply.	Principle 2: openness	Category2:Core interoperability principles
(P) Principles	R3.P2.C2	R3.Ensure a level playing field for open source software and demonstrate active and fair consideration of using open source software, taking into account the total cost of ownership of the solution.	Principle 2: openness	Category2:Core interoperability principles
(P) Principles	R4.P2.C2	R4.Give preference to open specifications, taking due account of the coverage of functional needs, maturity and market support and innovation	Principle 2: openness	Category2:Core interoperability principles
(P) Principles	R5.P3.C2	R5.Ensure internal visibility and provide external interfaces for European public services.	Principle 3: transparency	Category2:Core interoperability principles
(P) Principles	R6.P4.C2	R6.Reuse and share solutions, and cooperate in the development of joint solutions when implementing European public services.	Principle 4: reusability	Category2:Core interoperability principles
(P) Principles	R7.P4.C2	R7.Reuse and share information and data when implementing European public	Principle 4: reusability	Category2:Core interoperability principles

		services, unless certain privacy or confidentiality restrictions apply		
(P) Principles	R8.P5.C2	R8: Do not impose any technological solutions on citizens, businesses and other administrations that are technology-specific or disproportionate to their real needs.	Principle 5: technological neutrality and data portability	Category2:Core interoperability principles
(P) Principles	R9.P5.C2	R9: Ensure data portability, namely that data is easily transferable between systems and applications supporting the implementation and evolution of European public services without unjustified restrictions, if legally possible.	Principle 5: technological neutrality and data portability	Category2:Core interoperability principles
(P) Principles	R10.P6.C3	R10.Use multiple channels to provide the European public service, to ensure that users can select the channel that best suits their needs.	Principle 6: user-centricity	C3: Principles related to generic user needs and expectations
(P) Principles	R11.P6.C3	R11.Provide a single point of contact in order to hide internal administrative complexity and facilitate users' access to European public services.	Principle 6: user-centricity	C3: Principles related to generic user needs and expectations
(P) Principles	R12.P6.C3	R12.Put in place mechanisms to involve users in analysis, design, assessment and further development of European public services.	Principle 6: user-centricity	C3: Principles related to generic user needs and expectations
(P) Principles	R13.P6.C3	R13.As far as possible under the legislation in force, ask users of European public services once-only and relevant-only information.	Principle 6: user-centricity	C3: Principles related to generic user needs and expectations
(P) Principles	R14.P7.C3	R14.Ensure that all European public services are accessible to all citizens, including persons with disabilities, the elderly and other disadvantaged groups. For digital public services, public administrations should comply with	Principle 7: inclusion and accessibility	C3: Principles related to generic user needs and expectations

		e-accessibility specifications that are widely recognised at European or international level.		
(P) Principles	R15.P8.C3	R15.Define a common security and privacy framework and establish processes for public services to ensure secure and trustworthy data exchange between public administrations and in interactions with citizens and businesses.	Principle 8: security and privacy	C3: Principles related to generic user needs and expectations
(P) Principles	R16.P9.C3	R16.Use information systems and technical architectures that cater for multilingualism when establishing a European public service. Decide on the level of multilingualism support based on the needs of the expected users.	Principle 9: multilingualism	C3: Principles related to generic user needs and expectations
(P) Principles	R17.P10.C4	R17.Simplify processes and use digital channels whenever appropriate for the delivery of European public services, to respond promptly and with high quality to users' requests and reduce the administrative burden on public administrations, businesses and citizens.	Principle 10: administrative simplification	C4: Foundation principles for cooperation among public administrations
(P) Principles	R18.P11.C4	R18.Formulate a long-term preservation policy for information related to European public services and especially for information that is exchanged across borders.	Principle 11: preservation of information	C4: Foundation principles for cooperation among public administrations
(P) Principles	R19.P12.C4	R19.Evaluate the effectiveness and efficiency of different interoperability solutions and technological options considering user needs, proportionality and balance between costs and benefits.	Principle 12: assessment of effectiveness and efficiency	C4: Foundation principles for cooperation among public administrations

(L) Layers	R20.LIG	R20.Ensure holistic governance of interoperability activities across administrative levels and sectors.	Interoperability governance	
(L) Layers	R21.LIG	R21.Put in place processes to select relevant standards and specifications, evaluate them, monitor their implementation, check compliance and test their interoperability.	Interoperability governance	
(L) Layers	R22.LIG	R22.Use a structured, transparent, objective and common approach to assessing and selecting standards and specifications. Take into account relevant EU recommendations and seek to make the approach consistent across borders.	Interoperability governance	
(L) Layers	R23.LIG	R23.Consult relevant catalogues of standards, specifications and guidelines at national and EU level, in accordance with your NIF and relevant DIFs, when procuring and developing ICT solutions.	Interoperability governance	
(L) Layers	R24.LIG	R24.Actively participate in standardisation work relevant to your needs to ensure your requirements are met.	Interoperability governance	
(L) Layers	R25.LPS	R25.Ensure interoperability and coordination over time when operating and delivering integrated public services by putting in place the necessary governance structure.	Integrated public service governance	
(L) Layers	R26.LPS	R26.Establish interoperability agreements in all layers, complemented by operational agreements and change management procedures	Integrated public service governance	

(L) Layers	R27.L1	R27.Ensure that legislation is screened by means of ‘interoperability checks’, to identify any barriers to interoperability. When drafting legislation to establish a European public service, seek to make it consistent with relevant legislation, perform a ‘digital check’ and consider data protection requirements.	Legal interoperability	
(L) Layers	R28.O2	R28.Document your business processes using commonly accepted modelling techniques and agree on how these processes should be aligned to deliver a European public service.	Organisational interoperability	
(L) Layers	R29.O2	R29.Clarity and formalise your organisational relationships for establishing and operating European public services.	Organisational interoperability	
(L) Layers	R30.S	R30.Perceive data and information as a public asset that should be appropriately generated, collected, managed, shared, protected and preserved.	Semantic interoperability	
(L) Layers	R31.S	R31.Put in place an information management strategy at the highest possible level to avoid fragmentation and duplication. Management of metadata, master data and reference data should be prioritised.	Semantic interoperability	
(L) Layers	R32.S	R32.Support the establishment of sector-specific and cross-sectoral communities that aim to create open information specifications and encourage relevant communities to share their results on national and European platforms.	Semantic interoperability	

(L) Layers	R33.T	R33.Use open specifications, where available, to ensure technical interoperability when establishing European public services.	Technical interoperability	
(M) Model	R34.M	R34.Use the conceptual model for European public services to design new services or reengineer existing ones and reuse, whenever possible, existing service and data components.	Conceptual model for integrated public services	
(M) Model	R35.M	R35.Decide on a common scheme for interconnecting loosely coupled service components and put in place and maintain the necessary infrastructure for establishing and maintaining European public services.	Conceptual model for integrated public services	
(M) Model	R36.MC1	R36.Develop a shared infrastructure of reusable services and information sources that can be used by all public administrations.	Conceptual model for integrated public services: Internal information sources and services	
(M) Model	R37.MC2	R37.Make authoritative sources of information available to others while implementing access and control mechanisms to ensure security and privacy in accordance with the relevant legislation.	Conceptual model for integrated public services: Base registries	
(M) Model	R38.MC2	R38.Develop interfaces with base registries and authoritative sources of information, publish the semantic and technical means and documentation needed for others to connect and reuse available information.	Conceptual model for integrated public services: Base registries	

(M) Model	R39.MC2	R39.Match each base registry with appropriate metadata including the description of its content, service assurance and responsibilities, the type of master data it keeps, conditions of access and the relevant licences, terminology, a glossary, and information about any master data it uses from other base registries.	Conceptual model for integrated public services: Base registries	
(M) Model	R40.MC2	R40.Create and follow data quality assurance plans for base registries and related master data.	Conceptual model for integrated public services: Base registries	
(M) Model	R41.MC3	R41.Establish procedures and processes to integrate the opening of data in your common business processes, working routines, and in the development of new information systems.	Conceptual model for integrated public services: Open data	
(M) Model	R42.MC3	R42.Publish open data in machine-readable, non-proprietary formats. Ensure that open data is accompanied by high quality, machine-readable metadata in nonproprietary formats, including a description of their content, the way data is collected and its level of quality and the licence terms under which it is made available. The use of common vocabularies for expressing metadata is recommended.	Conceptual model for integrated public services: Open data	

(M) Model	R43.MC3	R43.Communicate clearly the right to access and reuse open data. The legal regimes for facilitating access and reuse, such as licences, should be standardised as much as possible.	Conceptual model for integrated public services: Open data	
(M) Model	R44.MC4	R44.Put in place catalogues of public services, public data, and interoperability solutions and use common models for describing them.	Conceptual model for integrated public services: Catalogues	
(M) Model	R45.MC5	R45.Where useful and feasible to do so, use external information sources and services while developing European public services.	Conceptual model for integrated public services: External information sources and services	
(M) Model	R46.MC6	R46.Consider the specific security and privacy requirements and identify measures for the provision of each public service according to risk management plans.	Conceptual model for integrated public services: Security and privacy	
(M) Model	R47.MC6	R47.Use trust services according to the Regulation on eID and Trust Services as mechanisms that ensure secure and protected data exchange in public services.	Conceptual model for integrated public services: Security and privacy	

Table 4: EIF v2 categorisation

EIF v.2 categorisation							
	New EIF Recommendations (47)	Principles, Layers, Model	EIF v.3 Recommendations (47)	EIF v.2 Recommendations (25)	EIFv.2 Principles, Framework Levels, Agreements, Governance	*Score: 0 =same R=1 rephrase R=2 new or major change	comments in relation to EIF
(P) Principles	R1.P1.C1	Principle 1: subsidiarity and proportionality	R1.Ensure that national interoperability frameworks and interoperability strategies are aligned with the EIF and, if needed, tailor and extend them to address the national context and needs	R1. Public administrations should align their interoperability frameworks with the European Interoperability Framework to take into account the European dimension of public service delivery.	Interoperability frameworks	1	From general recommendation to P1. subsidiarity and proportionality and the Public Administration is deleted
(P) Principles	R2.P2.C2	Principle 2: openness	R2.Publish the data you own as open data unless certain restrictions apply.		P9	2	New
(P) Principles	R3.P2.C2	Principle 2: openness	R3.Ensure a level playing field for open source software and		P9	1	General comments: P9.While respecting data

			demonstrate active and fair consideration of using open source software, taking into account the total cost of ownership of the solution.				protection and privacy, interoperability involves sharing information among interacting organisations, and hence implies openness. Applying the principle of openness when jointly developing custom-made software systems, European public administrations generate results that can be interconnected reused and shared, which also improves efficiency. Therefore,
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							European public administrations should aim for openness, taking into account needs, priorities, legacy, budget, market situation and a number of other factors. R6. Public administrations should aim for openness when working together to establish European public services, while taking into account their priorities and constraints.
(P) Principles	R4.P2.C2	Principle 2: openness	R4.Give preference to open specifications, taking due account of the coverage of functional needs,		P9	1	General comments: P9 while respecting data protection and privacy,

			maturity and market support and innovation				interoperability involves sharing information among interacting organisations, and hence implies openness. Applying the principle of openness when jointly developing custom-made software systems, European public administrations generate results that can be interconnected reused and shared, which also improves efficiency. Therefore, European public
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							administrations should aim for openness, taking into account needs, priorities, legacy, budget, market situation and a number of other factors. R6. Public administrations should aim for openness when working together to establish European public services, while taking into account their priorities and constraints.
(P) Principles	R5.P3.C2	Principle 3: transparency	R5.Ensure internal visibility and provide external interfaces for European public services.		P7	2	New: general comments with the same: Citizens and businesses should be able to understand administrative

							processes. They should have the right to track administrative procedures that involve them, and have insight into the rationale behind decisions that could affect them. Transparency also allows citizens and businesses to give feedback about the quality of the public services provided, to contribute to their improvement and to the implementation of new services.
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(P) Principles	R6.P4.C2	Principle 4: reusability	R6.Reuse and share solutions, and cooperate in the development of joint solutions when implementing European public services.	R7. Public administrations are encouraged to reuse and share solutions and to cooperate on the development of joint solutions when implementing European public services.	P10	1	Public Administration is deleted
(P) Principles	R7.P4.C2	Principle 4: reusability	R7.Reuse and share information and data when implementing European public services, unless certain privacy or confidentiality restrictions apply		P10	2	
(P) Principles	R8.P5.C2	Principle 5: technological neutrality and data portability	R8: Do not impose any technological solutions on citizens, businesses and other administrations that are technology-specific or disproportionate to their real needs.	R8.Public administrations should not impose any specific technological solution on citizens, businesses and other administrations when establishing European public services.	P11	1	slight rephrase

(P) Principles	R9.P5.C2	Principle 5: technological neutrality and data portability	R9: Ensure data portability, namely that data is easily transferable between systems and applications supporting the implementation and evolution of European public services without unjustified restrictions, if legally possible.		P11	2	NEW: data portability
(P) Principles	R10.P6.C3	Principle 6: user-centricity	R10. Use multiple channels to provide the European public service, to ensure that users can select the channel that best suits their needs.	multichannel delivery, allowing access to services anyhow, anywhere, anytime;	P2	1	NO R but same text referred in P2. User-centricity “Generally speaking, citizens and businesses will expect: to access user-friendly services in a secure and flexible manner allowing personalisation; • multichannel delivery,

							allowing access to services anyhow, anywhere, anytime; • to access a single contact point, even when multiple administrations have to work together to provide the service; • to provide only the information necessary to obtain the public service and to provide any given piece of information only once to administrations ; • administrations to respect privacy.”
(P) Principles	R11.P6.C3	Principle 6: user-centricity	R11.Provide a single point of contact in order to hide internal	to access a single contact point, even when multiple administrations	P2	1	NO R but same text referred in P2: User-centricity

			administrative complexity and facilitate users' access to European public services.	have to work together to provide the service;			“Generally speaking, citizens and businesses will expect: • to access user-friendly services in a secure and flexible manner allowing personalisation; • multichannel delivery, allowing access to services anyhow, anywhere, anytime; • to access a single contact point, even when multiple administrations have to work together to provide the service; • to provide only the information necessary to obtain the
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							public service and to provide any given piece of information only once to administrations ; • administrations to respect privacy”.
(P) Principles	R12.P6.C3	Principle 6: user-centricity	R12.Put in place mechanisms to involve users in analysis, design, assessment and further development of European public services.			2	
(P) Principles	R13.P6.C3	Principle 6: user-centricity	R13.As far as possible under the legislation in force, ask users of European public services once-only and relevant-only information.	to provide only the information necessary to obtain the public service and to provide any given piece of information only once to administrations;	P2	1	NO R but same text referred in P2: User-centricity “Generally speaking, citizens and businesses will expect: • to access user-friendly services in a secure and

							flexible manner allowing personalisation; • multichannel delivery, allowing access to services anyhow, anywhere, anytime; • to access a single contact point, even when multiple administrations have to work together to provide the service; • to provide only the information necessary to obtain the public service and to provide any given piece of information only once to administrations ; • administrations
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							to respect privacy.” slight rephrase
(P) Principles	R14.P7.C3	Principle 7: inclusion and accessibility	R14.Ensure that all European public services are accessible to all citizens, including persons with disabilities, the elderly and other disadvantaged groups. For digital public services, public administrations should comply with e-accessibility specifications that are widely recognised at European or international level.	R2. Public administrations should ensure that public services are accessible to all citizens, including persons with disabilities and the elderly, according to e-accessibility specifications widely recognised at European or international level.	P3	1	
(P) Principles	R15.P8.C3	Principle 8: security and privacy	R15.Define a common security and privacy framework and establish processes for public services to ensure secure and trustworthy data exchange between	R3.Public administrations should consider the specific needs of each European public service, within the context of a common security and privacy policy	P4	2	considered new due to the change for framework and date

			public administrations and in interactions with citizens and businesses.				
(P) Principles	R16.P9.C3	Principle 9: multilingualism	R16.Use information systems and technical architectures that cater for multilingualism when establishing a European public service. Decide on the level of multilingualism support based on the needs of the expected users.	R4.Public administrations should use information systems and technical architectures that cater for multilingualism when establishing a European public service.	P5	1	the level of multilingualism is inserted
(P) Principles	R17.P10.C4	Principle 10: administrative simplification	R17.Simplify processes and use digital channels whenever appropriate for the delivery of European public services, to respond promptly and with high quality to users' requests and reduce		P6	2	is considered new because of the clarity of instructions although it was referred the reduce of administrative burden. "For this reason, the European Commission

			the administrative burden on public administrations, businesses and citizens.				proposed in January 2007 to reduce the administrative burden on businesses by 25% by 2012. To achieve this target, public authorities across Europe will have to act together when establishing European public services."
(P) Principles	R18.P11.C4	Principle 11: preservation of information	R18. Formulate a long-term preservation policy for information related to European public services and especially for information that is exchanged across borders.	R5. Public administrations should formulate together a long-term preservation policy for electronic records relating to European public services.	P8	1	electronic record is changed to information and PA is deleted
(P) Principles	R19.P12.C4	Principle 12: assessment of	R19. Evaluate the effectiveness and efficiency of different		P12	2	New because of clear instructions "Public

		effectiveness and efficiency	interoperability solutions and technological options considering user needs, proportionality and balance between costs and benefits.				administrations should ensure that solutions serve businesses and citizens in the most effective and efficient way and provide the best value for taxpayer money."
(L) Layers	R20.LIG	Interoperability governance	R20.Ensure holistic governance of interoperability activities across administrative levels and sectors.	R25.Public administrations should establish a framework for the governance of their interoperability activities across administrative levels.		2	New because although the holistic approach is stated in the description of interoperability governance in the R is stated as framework also PA is deleted.
(L) Layers	R21.LIG	Interoperability governance	R21.Put in place processes to select relevant standards and specifications, evaluate them, monitor their implementation,			2	new

			check compliance and test their interoperability.				
(L) Layers	R22.LIG	Interoperability governance	R22.Use a structured, transparent, objective and common approach to assessing and selecting standards and specifications. Take into account relevant EU recommendations and seek to make the approach consistent across borders.	R21.Public administrations should use a structured, transparent and objective approach to assessing and selecting formalised specifications.	Interoperability agreements / Assessing and selecting formalised specifications	2	New because on the New EIF it's an agreement on horizontal and mainly because EU recommendations to be taken into account
(L) Layers	R23.LIG	Interoperability governance	R23.Consult relevant catalogues of standards, specifications and guidelines at national and EU level, in accordance with your NIF and relevant DIFs, when procuring and developing ICT solutions.			2	new

(L) Layers	R24.LIG	Interoperability governance	R24. Actively participate in standardisation work relevant to your needs to ensure your requirements are met.	R23. Public administrations should lead or actively participate in standardisation work relevant to their needs.	Interoperability agreements/ Contribution to the standardisation process	1	PA is deleted
(L) Layers	R25.LPS	Integrated public service governance	R25. Ensure interoperability and coordination over time when operating and delivering integrated public services by putting in place the necessary governance structure.	R24. Public administrations should ensure that interoperability is ensured over time when operating and delivering a European public service.	Interoperability governance	1	PA is deleted
(L) Layers	R26.LPS	Integrated public service governance	R26. Establish interoperability agreements in all layers, complemented by operational agreements and change management procedures	R17. Public administrations working together to provide European public services should agree on change management processes to ensure continuous service delivery	Change management/ Organisational Interoperability	2	In the new EIF this R is in Integrated public service governance, PA is deleted, operational agreements are inserted. New not only because of the structure but

							the horizontal change which affects all the layers.
(L) Layers	R27.L1	Legal interoperability	R27.Ensure that legislation is screened by means of ‘interoperability checks’, to identify any barriers to interoperability. When drafting legislation to establish a European public service, seek to make it consistent with relevant legislation, perform a ‘digital check’ and consider data protection requirements.	R14.Public administrations should carefully consider all relevant legislation relating to data exchange, including data protection legislation, when seeking to establish a European public service.		2	new insertion interoperability checks, and digital check while drafting legislation

(L) Layers	R28.O2	Organisational interoperability	R28.Document your business processes using commonly accepted modelling techniques and agree on how these processes should be aligned to deliver a European public service.	R15.Public administrations should document their business processes and agree on how these processes will interact to deliver a European public service.	Business process alignment	1	PA is deleted and commonly accepted modeling techniques and alignment to deliver a service are inserted.
(L) Layers	R29.O2	Organisational interoperability	R29.Clarity and formalise your organisational relationships for establishing and operating European public services.	R16.Public administrations should clarify their organisational relationships as part of the establishment of a European public service.	Organisational relationships	1	PA is deleted and operating a service is inserted
(L) Layers	R30.S	Semantic interoperability	R30.Perceive data and information as a public asset that should be appropriately generated, collected, managed, shared, protected and preserved.			2	new

(L) Layers	R31.S	Semantic interoperability	R31.Put in place an information management strategy at the highest possible level to avoid fragmentation and duplication. Management of metadata, master data and reference data should be prioritised.			2	new
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(L) Layers	R32.S	Semantic interoperability	R32.Support the establishment of sector-specific and cross-sectoral communities that aim to create open information specifications and encourage relevant communities to share their results on national and European platforms.	*R18.Public administrations should support the establishment of sector specific and cross-sectoral communities that aim to facilitate semantic interoperability and should encourage the communities to share results on national and European platforms. Public administrations, when establishing European public services. In addition, R20. Should base interoperability agreements on existing formalised specifications, or, if they do not exist, cooperate with communities working in the same areas.	R20. Interoperability Agreements	1	PA is deleted R 18 AND R20 communities Combined
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(L) Layers	R33.T	Technical interoperability	R33.Use open specifications, where available, to ensure technical interoperability when establishing European public services.	*R19.Public administrations should agree on the formalised specifications to ensure technical interoperability when establishing European public services and R22.When establishing European public services, public administrations should prefer open specifications, taking due account of the coverage of functional needs, maturity and market support. And R20 Public administrations, when establishing European public services, should base interoperability agreements on existing formalised specifications, or, if	R22 from Interoperability Agreements/ Specification, openness and reuse and R19	2	*new R 19 and R22 and R20 combination for specifications
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				they do not exist, cooperate with communities working in the same areas.			
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(M) Model	R34.M	Conceptual model for integrated public services	R34.Use the conceptual model for European public services to design new services or reengineer existing ones and reuse, whenever possible, existing service and data components.	R9. Public administrations should develop a component-based service model, allowing the establishment of European public services by reusing, as much as possible, existing service components.		2	New because data components is inserted and reengineer.
(M) Model	R35.M	Conceptual model for integrated public services	R35.Decide on a common scheme for interconnecting loosely coupled service components and put in place and maintain the necessary infrastructure for establishing and maintaining European public services.	R10.Public administrations should agree on a common scheme to interconnect loosely coupled service components and put in place the necessary infrastructure when establishing European public services.		1	PA is removed and maintaining is inserted.

(M) Model	R36.MC1	Conceptual model for integrated public services: Internal information sources and services	R36.Develop a shared infrastructure of reusable services and information sources that can be used by all public administrations.		Basic Public Services	2	New no R and Shared services is inserted.
(M) Model	R37.MC2	Conceptual model for integrated public services:Base registries	R37.Make authoritative sources of information available to others while implementing access and control mechanisms to ensure security and privacy in accordance with the relevant legislation.	R11.Public administrations should make their authentic sources of information available to others while implementing access and control mechanisms to ensure security and privacy in accordance with the relevant legislation.		0	PA is deleted, authentic sources as well

(M) Model	R38.MC2	Conceptual model for integrated public services: Base registries	R38.Develop interfaces with base registries and authoritative sources of information, publish the semantic and technical means and documentation needed for others to connect and reuse available information.	R12.Public administrations, when working to establish European public services, should develop interfaces to authentic sources and align them at semantic and technical level.		1	PA is deleted, connect and reuse is inserted.
(M) Model	R39.MC2	Conceptual model for integrated public services: Base registries	R39.Match each base registry with appropriate metadata including the description of its content, service assurance and responsibilities, the type of master data it keeps, conditions of access and the relevant licences, terminology, a glossary, and information about any master data it uses from			2	new for metadata

			other base registries.				
(M) Model	R40.MC2	Conceptual model for integrated public services: Base registries	R40.Create and follow data quality assurance plans for base registries and related master data.			2	new for date
(M) Model	R41.MC3	Conceptual model for integrated public services: Open data	R41.Establish procedures and processes to integrate the opening of data in your common business processes, working routines, and in the development of			2	new for open data

			new information systems.				
(M) Model	R42.MC3	Conceptual model for integrated public services: Open data	R42.Publish open data in machine-readable, non-proprietary formats. Ensure that open data is accompanied by high quality, machine-readable metadata in nonproprietary formats, including a description of their content, the way data is collected and its level of quality and the licence terms under which it is made available. The use of common vocabularies for expressing			2	new for open data

			metadata is recommended.				
(M) Model	R43.MC3	Conceptual model for integrated public services: Open data	R43.Communicate clearly the right to access and reuse open data. The legal regimes for facilitating access and reuse, such as licences, should be standardised as much as possible.			2	new for open data

(M) Model	R44.MC4	Conceptual model for integrated public services: Catalogues	R44.Put in place catalogues of public services, public data, and interoperability solutions and use common models for describing them.			2	new for catalogues
(M) Model	R45.MC5	Conceptual model for integrated public services: External information sources and services	R45.Where useful and feasible to do so, use external information sources and services while developing European public services.			2	new for external information sources and services
(M) Model	R46.MC6	Conceptual model for integrated public services: Security and privacy	R46.Consider the specific security and privacy requirements and identify measures for the provision of each public service according to risk management plans.	R13.Public administrations, when working together to establish European public services, should use a common taxonomy of basic public services and agree on minimum service requirements for	Secure Communications Management/Secure Data Exchange Management	2	Is considered new due to the difference in the element of the model and risk plan is inserted while the common taxonomy is deleted.

				secure data exchange.			
(M) Model	R47.MC6	Conceptual model for integrated public services: Security and privacy	R47.Use trust services according to the Regulation on eID and Trust Services as mechanisms that ensure secure and protected data exchange in public services.			2	new eID and Trust Services as mechanisms

Table 5:EIF v1 categorisation

EIF v.1						
	EIF V.3 Recommendations (47)	EIF v.3 Recommendations (47)	EIF1 v.1 Recommendations 17	EIF v.1 Principles, Framework Levels, Agreements, Governance	*Score: 0= same R, 1= rephrase R, 2= new or major change R	comments in relation to EIF
(P) Principles	R1.P1.C1	R1.Ensure that national interoperability frameworks and interoperability strategies are aligned with the EIF and, if needed, tailor and extend them to address the national context and needs	R1: Member State administrations and EU Institutions and Agencies should use the guidance provided by this European Framework to introduce a pan-European dimension into their own interoperability frameworks and administrative infrastructures to enable interoperable pan-	introduction: 1.1.4. Area of validity	2	obligation rather than proposal

			European eGovernment services. Adherence to the EIF should also be mentioned in the national interoperability frameworks. For IDABC projects, the guidance provided by the EIF and related documents should be considered mandatory.			
(P) Principles	R2.P2.C2	R2.Publish the data you own as open data unless certain restrictions apply.			2	new
(P) Principles	R3.P2.C2	R3.Ensure a level playing field for open source software and demonstrate active and fair consideration of using open source software, taking into account		P.7 Use of Open Standards	1	

		the total cost of ownership of the solution.				
(P) Principles	R4.P2.C2	R4.Give preference to open specifications, taking due account of the coverage of functional needs, maturity and market support and innovation			2	new
(P) Principles	R5.P3.C2	R5.Ensure internal visibility and provide external interfaces for European public services.	General R for PAs	High level policy issues: Transparency: Ease of finding and using services, thus allowing citizens and enterprises better access to and participation in administrative matters and political issues.	1	
(P) Principles	R6.P4.C2	R6.Reuse and share solutions, and cooperate in the development of joint solutions when implementing European public services.			2	
(P) Principles	R7.P4.C2	R7.Reuse and share information and data when implementing		R.10 (TECHNICAL): At front-office level, technical interoperability aspects should be considered for the	1	

		European public services, unless certain privacy or confidentiality restrictions apply		following fields: Data presentation and exchange		
(P) Principles	R8.P5.C2	R8: Do not impose any technological solutions on citizens, businesses and other administrations that are technology-specific or disproportionate to their real needs.			2	
(P) Principles	R9.P5.C2	R9: Ensure data portability, namely that data is easily transferable between systems and applications supporting the implementation and evolution of European public services without unjustified restrictions, if legally possible.			2	

(P) Principles	R10.P6.C3	R10.Use multiple channels to provide the European public service, to ensure that users can select the channel that best suits their needs.		1.3 underlying principles: Accessibility	1	In terms of eInclusion, a multi-channel approach should be considered in order to render the services available to citizens and enterprises through several different communication means (kiosks, web-TV, mobile connectivity, etc.).
(P) Principles	R11.P6.C3	R11.Provide a single point of contact in order to hide internal administrative complexity and facilitate users' access to European public services.			2	
(P) Principles	R12.P6.C3	R12.Put in place mechanisms to involve users in analysis, design, assessment and further development of European public services.		general approach	1	Redesign administrative processes and make the best use of the available technology. This is also an opportunity to make services more user-centred.

(P) Principles	R13.P6.C3	R13.As far as possible under the legislation in force, ask users of European public services once-only and relevant-only information.			2	
(P) Principles	R14.P7.C3	R14.Ensure that all European public services are accessible to all citizens, including persons with disabilities, the elderly and other disadvantaged groups. For digital public services, public administrations should comply with e-accessibility specifications that are widely recognised at European or international level.			1	e that eGovernment creates equal opportunities for all through open, inclusive electronic services that are publicly accessible without discrimination. Generally accepted design principles for interfaces should be applied in order to ensure access for disabled persons and offer support in a language understood by the user.
(P) Principles	R15.P8.C3	R15.Define a common security and privacy framework and		principle: security	1	Overall, the reliable exchange of information takes place in conformity

		establish processes for public services to ensure secure and trustworthy data exchange between public administrations and in interactions with citizens and businesses.				with an established security policy.
(P) Principles	R16.P9.C3	R16.Use information systems and technical architectures that cater for multilingualism when establishing a European public service. Decide on the level of multilingualism support based on the needs of the expected users.		principle: multilingualism	1	
(P) Principles	R17.P10.C4	R17.Simplify processes and use digital channels whenever appropriate for the delivery			2	

		of European public services, to respond promptly and with high quality to users' requests and reduce the administrative burden on public administrations, businesses and citizens.				
(P) Principles	R18.P11.C4	R18.Formulate a long-term preservation policy for information related to European public services and especially for information that is exchanged across borders.			2	
(P) Principles	R19.P12.C4	R19.Evaluate the effectiveness and efficiency of different interoperability solutions and technological options considering user needs, proportionality and balance		R for NIFs policy	1	Effectiveness: eGovernment will not be limited to the provision of standard administration services by electronic means; it will also allow the delivery of entirely new services.

		between costs and benefits.				
(L) Layers	R20.LIG	R20.Ensure holistic governance of interoperability activities across administrative levels and sectors.			2	
(L) Layers	R21.LIG	R21.Put in place processes to select relevant standards and specifications, evaluate them, monitor their implementation, check compliance and test their interoperability.			2	
(L) Layers	R22.LIG	R22.Use a structured, transparent, objective and common approach to assessing and selecting standards and specifications. Take into account relevant EU recommendations and seek to make the approach			2	

		consistent across borders.				
(L) Layers	R23.LIG	R23.Consult relevant catalogues of standards, specifications and guidelines at national and EU level, in accordance with your NIF and relevant DIFs, when procuring and developing ICT solutions.		general approach R for NIFS	1	Incorporate existing standards in a larger context.
(L) Layers	R24LIG	R24.Actively participate in standardisation work relevant to your needs to ensure your requirements are met.			2	
(L) Layers	R25.LPS	R25.Ensure interoperability and coordination over time when operating and delivering integrated public services by putting in place the			2	

		necessary governance structure.				
(L) Layers	R26.LPS	R26.Establish interoperability agreements in all layers, complemented by operational agreements and change management procedures			2	
(L) Layers	R27.L1	R27.Ensure that legislation is screened by means of ‘interoperability checks’, to identify any barriers to interoperability. When drafting legislation to establish a European public service, seek to make it consistent with relevant legislation, perform a ‘digital check’ and consider			2	

		data protection requirements.				
(L) Layers	R28.O2	R28.Document your business processes using commonly accepted modelling techniques and agree on how these processes should be aligned to deliver a European public service.		R13	1	Member State administrations and EU Institutions and Agencies should develop and use common guidelines for the technical interoperability of pan-European networks, applications and services in the context of eGovernment. The IDA(BC) guidelines ³⁶ should constitute the basis for such guidelines, and be updated accordingly,

(L) Layers	R29.O2	R29.Clarify and formalise your organisational relationships for establishing and operating European public services.		R6	1	RECOMMENDATION 6 (ORGANISATIONAL): Where the provision of a pan-European eGovernment service requires contribution from several public administrations across Europe, the respective expectations should be formalised, for example by means of service level agreements. Such agreements should at least be considered between the different business interoperability interfaces (BII) concerned (at pan-European level). In addition, a common security policy
(L) Layers	R30.S	R30.Perceive data and information as a public asset that should be appropriately generated,			2	

		collected, managed, shared, protected and preserved.				
(L) Layers	R31.S	R31.Put in place an information management strategy at the highest possible level to avoid fragmentation and duplication. Management of metadata, master data and reference data should be prioritised.			2	
(L) Layers	R32.S	R32.Support the establishment of sector-specific and cross-sectoral communities that aim to create open information specifications and encourage relevant communities to share their results on national			2	

		and European platforms.				
(L) Layers	R33.T	R33.Use open specifications, where available, to ensure technical interoperability when establishing European public services.			2	
(M) Model	R34.M	R34.Use the conceptual model for European public services to design new services or reengineer existing ones and reuse, whenever possible, existing service and data components.			2	

(M) Model	R35.M	R35.Decide on a common scheme for interconnecting loosely coupled service components and put in place and maintain the necessary infrastructure for establishing and maintaining European public services.			2	
(M) Model	R36.MC1	R36.Develop a shared infrastructure of reusable services and information sources that can be used by all public administrations.		use of multilater solutions	1	USE OF MULTILATERAL SOLUTIONS In a multi-actor environment, one way to achieve interoperability is to consider different solutions according to the exchange partner one has to communicate with, leading to bi-lateral solutions and agreement. The net effect (and disadvantage) of such an approach is that it

						requires as many communications as there are external partners, resulting in less efficiency and higher costs. On the other hand, if each of the interoperating partners adopts the same set of agreements for interoperability solutions, each of them can reap the benefits of a single solution that is developed once and fits the needs of all.
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(M) Model	R37.MC2	R37.Make authoritative sources of information available to others while implementing access and control mechanisms to ensure security and privacy in accordance with the relevant legislation.		privacy	1	Appropriate information regarding the data EUROPEAN INTEROPERABILITY FRAMEWORK FOR PAN-EUROPEAN eGOVERNMENT SERVICES 8 1.3. Underlying principles 13 OJ L 101/1 - COUNCIL DECISION of 19 March 2001 adopting the Council's security regulations (2001/264/EC), see also OJ L 137/1 COMMISSION DECISION of 29 November 2001 amending its internal Rules of Procedure (notified under document number C(2001) 3031) (2001/844/EC, ECSC, Euratom) 14 The European Court of Justice has emphasised in its recent judgement of
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						20 May 2003 in the Rechnungshof case the importance of the cumulative application of articles 6 and 7 of Directive 95/46/EC INTRODUCTION 9 processing activities should be made available to the concerned individuals. Full compliance with the existing European and national data protection legislation should be ensured
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(M) Model	R38.MC2	R38.Develop interfaces with base registries and authoritative sources of information, publish the semantic and technical means and documentation needed for others to connect and reuse available information.		7. semantic	1	For each eGovernment service considered at a pan-European level, the data elements to be exchanged should be made interoperable by requiring • The responsible administrations to publish information on the corresponding data elements involved at national level. • The responsible administrations to draft proposals for and agree on the data and the related data dictionaries required at pan-European level. This work should be performed on the basis of core eGovernment data elements common to all pan-European eGovernment services. The sector-specific eGovernment data elements should
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						then be defined and agreed upon. • The responsible administrations to draft proposals for and agree on multilateral mapping tables between the various national and pan-European data elements.
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(M) Model	R39.MC2	R39.Match each base registry with appropriate metadata including the description of its content, service assurance and responsibilities, the type of master data it keeps, conditions of access and the relevant licences, terminology, a glossary, and information about any master data it uses from other base registries.			2	
(M) Model	R40.MC2	R40.Create and follow data quality assurance plans for base registries and related master data.				

(M) Model	R41.MC3	R41.Establish procedures and processes to integrate the opening of data in your common business processes, working routines, and in the development of new information systems.			2	
(M) Model	R42.MC3	R42.Publish open data in machine-readable, non-proprietary formats. Ensure that open data is accompanied by high quality, machine-readable metadata in nonproprietary formats, including a description of their content, the way data is collected and its level of quality and the licence terms under which it is			2	

		made available. The use of common vocabularies for expressing metadata is recommended.				
(M) Model	R43.MC3	R43.Communicate clearly the right to access and reuse open data. The legal regimes for facilitating access and reuse, such as licences, should be standardised as much as possible.			2	

(M) Model	R44.MC4	R44.Put in place catalogues of public services, public data, and interoperability solutions and use common models for describing them.			2	
(M) Model	R45.MC5	R45.Where useful and feasible to do so, use external information sources and services while developing European public services.			2	
(M) Model	R46.MC6	R46.Consider the specific security and privacy requirements and identify measures for the provision of each public service according to risk management plans.		p.security and privacy	1	measures is new and risk management

(M) Model	R47.MC6	R47.Use trust services according to the Regulation on eID and Trust Services as mechanisms that ensure secure and protected data exchange in public services.			2	
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II. Questionnaire in Greek Language- Ελληνική Έκδοση

**Ελληνικό Πλαίσιο Διαλειτουργικότητας - eGIF
ΕΡΩΤΗΜΑΤΟΛΟΓΙΟ ΓΙΑ ΤΗΝ ΕΝΗΜΕΡΩΣΗ ΚΑΙ ΕΦΑΡΜΟΓΗ ΤΟΥ ΠΛΑΙΣΙΟΥ
ΗΛΕΚΤΡΟΝΙΚΗΣ ΔΙΑΚΥΒΕΡΝΗΣΗΣ eGIF ΣΤΗΝ ΕΛΛΗΝΙΚΗ ΔΗΜΟΣΙΑ
ΔΙΟΙΚΗΣΗ**

Το ερωτηματολόγιο αποτελείται από τέσσερα μέρη:

- A) Προσωπικές Πληροφορίες
- B) Γενικές πληροφορίες
- Γ) Εφαρμογή του Πλαισίου
- Δ) Συστάσεις για ενημέρωση του Πλαισίου

ΤΜΗΜΑ Α: ΠΡΟΣΩΠΙΚΕΣ ΠΛΗΡΟΦΟΡΙΕΣ

IV. Όνομα και Επώνυμο

V. Ηλεκτρονική Διεύθυνση

VI. Θα θέλετε να σας ενημερωθείτε για μελλοντικές ενέργειες σχετικά με το πλαίσιο Διαλειτουργικότητας από το Πανεπιστήμιο Αιγαίου και το Κέντρο Έρευνας για την Ηλεκτρονική Διακυβέρνηση πλαίσια ερευνητικών δραστηριοτήτων

- ΝΑΙ
- ΟΧΙ

ΤΜΗΜΑ Β: ΓΕΝΙΚΕΣ ΠΛΗΡΟΦΟΡΙΕΣ

1. Ο Φορέας που εργάζεστε είναι:

Κεντρικός Φορέας
Ανεξάρτητη Αρχή
ΝΠΔ
ΝΠΔΔ
Περιφέρεια
Δήμος
Άλλο

2. Η θέση σας στον οργανισμό είναι:

Διευθυντής Διεύθυνσης Πληροφορικής
Προϊστάμενος Τμήματος Πληροφορικής
Υπάλληλος Πληροφορικής
• Άλλο

3. Γνωρίζετε για το περιεχόμενο του Πλαισίου Παροχής Υπηρεσιών Ηλεκτρονικής Διακυβέρνησης (ΠΗΔ) (ΦΕΚ 1301/Β/12-04-2012) και αν ναι πως ενημερωθήκατε γι' αυτό;

http://www.et.gr/ids-nph/search/pdfViewerForm.html?args=5C7QrtC22wEbA_BZxkczbHdtvSoClrL8t41p22kte0EtIdow6HlTE-JInJ48_97uHrMts-

[zFzeyCiBSQOpYnTy36MacmUFCx2ppFvBej56Mmc8Qdb8ZfRjQZnsIAdk8Lv_e6czmhEem
bNmZCMxLMtcT-tYyepU1Eoc2VJ5j7LtROwoBjjL-iaf-bgRlbFKFH](#) =

Όχι

Ναι από ενημέρωση από εγκυκλίους του Υπουργείου Εσωτερικών

Ναι από την ιστοσελίδα της ΥΑΠ

Ναι από προσωπική αναζήτηση

Άλλο

ΤΜΗΜΑ Γ: ΕΦΑΡΜΟΓΗ ΤΟΥ ΠΛΑΣΙΟΥ

4. Θεωρείτε ότι ο Διαδικτυακός Τόπος (ΔΤ) του φορέα σας τηρεί το Πλαίσιο Παροχής Υπηρεσιών Ηλεκτρονικής Διακυβέρνησης (ΠΗΔ);

Ναι

Όχι

Δεν γνωρίζω

5. Έχουν ανατεθεί σε στελέχη στον φορέα σας για τον δικτυακό του τόπο (ΔΤ) οι ρόλοι: Επιτελικός Υπεύθυνος, Τεχνικός Υπεύθυνος & Υπεύθυνος Περιεχομένου;

• Επιτελικός Ναι Όχι

• Τεχνικός Ναι Όχι

• Υπεύθυνος Περιεχομένου Ναι Όχι

6. Υποστηρίζεται από κάποιο Νομικό Σύμβουλο του φορέα σας η λειτουργία του ΔΤ, ο οποίος ελέγχει επαρκώς τα νομικά ζητήματα που ανακύπτουν κατά την παροχή υπηρεσιών ηλεκτρονικής διακυβέρνησης (ΗΔ) όπως για παράδειγμα η διαχείριση προσωπικών δεδομένων;

Ναι

Όχι

Δεν το γνωρίζω

7. Η ακριβής ονοματοδοσία του ΔΤ σας, έχει εγκριθεί από την Εθνική Επιτροπή Τηλεπικοινωνιών και Ταχυδρομείων και είναι σύμφωνη με τον «Κανονισμό Διαχείρισης και Εκχώρησης Ονομάτων χώρου με κατάληξη .gr» της ΕΕΤΤ;

Ναι

Όχι

Δεν το γνωρίζω

8. Σύμφωνα με το ΠΠΔΔΤ οι φορείς ΠΡΕΠΕΙ ΝΑ αιτούνται ονόματα χώρου, τα οποία είναι σύμφωνα με την επίσημη ονομασία τους. Ισχύει για τον φορέα σας;

• Ναι

• Όχι αλλά πρόκειται να γίνει

• Όχι

9. Υπάρχει σαφώς ορισμένη διαδικασία δημοσίευσης περιεχομένου και υπηρεσιών μέσω του ΔΤ τόσο για την αρχική δημοσίευση όσο για την ενημέρωση-συντήρηση και με την εμπλοκή των κατάλληλων ρόλων;

Ναι

Όχι

Δεν το γνωρίζω

10. Λαμβάνονται αντίγραφα ασφαλείας των στοιχείων του ΔΤ του φορέα σας και αν ναι πόσο συχνά;

Όχι

Ναι κάθε μέρα
Ναι μέρα παρά μέρα
Ναι κάθε εβδομάδα
Ναι κάθε μήνα
Ναι σε μη τακτά χρονικά διαστήματα

11. Το πληροφοριακό υλικό και οι υπηρεσίες που παρέχονται μέσω του ΔΤ του φορέα σας, κατατάσσονται σε αντιπροσωπευτικές κατηγορίες οι οποίες ανήκουν στην ισχύουσα Λίστα Κυβερνητικών Κατηγοριών (Government Category List - GCL);
(<http://www.yap.gov.gr/images/stories/Plaisio/GCL-v4.0.PDF>)

Ναι
Όχι
Δεν το γνωρίζω

12. Έχει μεριμνήσει ο φορέας σας για την εγγραφή του ΔΤ σας σε μηχανές αναζήτησης (πχ google, yahoo);

- Ναι
- Όχι
- Δεν το γνωρίζω

13. Συμμορφώνεται ο ΔΤ του δήμου σας με το πρότυπο οδηγιών για την Προσβασιμότητα του Περιεχομένου του Ιστού Web Content Accessibility Guidelines (WCAG), έκδοση 2.0 σε επίπεδο συμμόρφωσης τουλάχιστον «AA» ώστε όλες αδιακρίτως οι ομάδες ανθρώπων να έχουν πρόσβαση στο περιεχόμενο και στις υπηρεσίες;
(<https://www.w3.org/TR/WCAG20/>)

Ναι σε επίπεδο «AA»
Ναι σε επίπεδο «AAA»
Όχι
Δεν γνωρίζω

14. Κατά το στάδιο ανάπτυξης και εξέλιξης του ΔΤ του φορέα σας, ποιοι από τους παρακάτω ελέγχους πραγματοποιήθηκαν με τη χρήση εργαλείων ή υπηρεσιών που προτείνονται από τον W3C;

(<https://www.w3.org/Status.html>)

- Έλεγχος συμμόρφωσης της σύνταξης HTML που περιλαμβάνεται στις ιστοσελίδες σύμφωνα με τα πρότυπα του W3C.
- Έλεγχος επικύρωσης της σωστής χρήσης Cascading Style Sheets (CSS).
- Έλεγχος ποιότητας, προσβασιμότητας και ιδιωτικότητας του περιεχομένου των ιστοσελίδων του ΔΤ.
- Δεν πραγματοποιήθηκαν κάποιοι από τους παραπάνω ελέγχους
- Δεν γνωρίζω

15. Ο ΔΤ παρέχει ενημέρωση στους χρήστες μέσω

Newsletters
RSS
Forum
Social Media

16. Δίνεται η δυνατότητα στους χρήστες του ΔΤ σας να αξιολογούν τις παρεχόμενες πληροφορίες ή υπηρεσίες;

- Ναι μέσω ηλεκτρονικών μορφών πολλαπλών επιλογών
- Ναι με υποβολή σχολίων μέσω email ή/και γενικών ηλεκτρονικών μορφών
- Ναι μέσω θεσμοθετημένης διαδικασίας αξιολόγησης της λειτουργίας του ΔΤ
- Όχι

- Other

17. Υπάρχει πολιτική σαφώς ορισμένη και εγκεκριμένη από τη Διοίκηση για την ασφάλεια του ΔΤ σας;

Όχι

Ναι

Ναι και αποτελεί μέρος της εγκεκριμένης, από τα όργανα του δήμου, πολιτικής ασφαλείας

18. Ο ΔΤ λειτουργεί σε δικού σας ή σε servers εξωτερικού συνεργάτη;

Σε δικούς μας servers

Σε servers του ΣΥΖΕΥΞΙΣ

Σε servers εξωτερικού συνεργάτη

19. Αν ο ΔΤ φιλοξενείται σε servers σας αυτοί βρίσκονται σε ειδικά διαμορφωμένο computer room;

Όχι

Ναι

19.α) Αν ναι τότε τι από τα παρακάτω διαθέτει το computer room;

- σύστημα πυρανίχνευσης και πυρόσβεσης
- ψευδοροφή
- υπερυψωμένο δάπεδο
- ηλεκτρονικό σύστημα ελεγχόμενης πρόσβασης
- γεννήτρια σε περίπτωση διακοπής της κανονικής τροφοδοσίας ηλεκτρικού ρεύματος
- Δε βρίσκονται σε ειδικά διαμορφωμένο χώρο

20. Σε ποιο επίπεδο παροχής ηλεκτρονικών υπηρεσιών συγκαταλέγονται οι υπηρεσίες που παρέχει η υπηρεσία σας;

Σύμφωνα με τους δείκτες που παρακολουθούνται σε ευρωπαϊκό επίπεδο2, ο βαθμός παροχής μίας υπηρεσίας της Δημόσιας Διοίκησης με ηλεκτρονικό τρόπο μέσω ενός συστήματος ηλεκτρονικής διακυβέρνησης κλιμακώνεται στα εξής τέσσερα επίπεδα:

- *Επίπεδο 1: Πληροφόρηση – Δημοσίευση (Information). Πλήρης κάλυψη της ανάγκης για ενημέρωση του πολίτη σχετικά με παρεχόμενες υπηρεσίες μέσω ενημερωτικού υλικού και οδηγιών δημοσιοποιημένων στη Διαδικτυακή Πύλη του Φορέα.*
- *Επίπεδο 2: Διάδραση – Αλληλεπίδραση (Interaction). Διάθεση στη Διαδικτυακή Πύλη του Φορέα επίσημων φορμών σε εκτυπώσιμη μορφή ώστε να ξεκινά η διαδικασία εξυπηρέτησης. Η ολοκλήρωση της διαδικασίας γίνεται με μη ηλεκτρονικό τρόπο.*
- *Επίπεδο 3: Αμφίδρομη διάδραση (Two-way interaction). Πρόσβαση μέσω της Διαδικτυακής Πύλης του Φορέα σε επίσημες ηλεκτρονικές φόρμες ώστε να ξεκινά η διαδικασία εξυπηρέτησης. Η διαδικασία μπορεί να περιλαμβάνει και την πιστοποίηση του χρήστη της υπηρεσίας. Η ολοκλήρωση της διαδικασίας εξυπηρέτησης γίνεται με μη ηλεκτρονικό τρόπο.*
- *Επίπεδο 4: Συναλλαγή (Transaction). Διαδικτυακές Πύλες και πληροφοριακά συστήματα του Φορέα που προσφέρουν στον πολίτη ολοκληρωμένο και πλήρως ηλεκτρονικό χειρισμό της υπηρεσίας περιλαμβάνοντας σύνθετες εργασίες όπως πιστοποίηση, απόφαση, ειδοποίηση, παράδοση και πληρωμή (εάν είναι απαραίτητο). Καμία επιπλέον εργασία δεν απαιτείται από τον πολίτη για την ολοκλήρωση της εξυπηρέτησής του.*
- Επίπεδο 1
- Επίπεδο 2
- Επίπεδο 3
- Επίπεδο 4

21. Η αυθεντικοποίηση των χρηστών για τις ηλεκτρονικές υπηρεσίες γίνεται με:

Δεν υπάρχει ανάγκη για αυθεντικοποίηση

Συνθηματικά

Διακριτικά συνθηματικά μιας χρήσης

Διακριτικά συνθηματικά χαλαρής αποθήκευσης

Διακριτικά συνθηματικά σκληρής αποθήκευσης

Με συνθηματικά της ΓΤΠΣ (taxisnet)

22. Για την προώθηση του ΔΤ ή κάποιας νέας παρεχόμενης ηλεκτρονικής υπηρεσίας, έχετε χρησιμοποιήσει κάποιο από τα παρακάτω μέσα; (0 – 4 απαντήσεις)

- Τηλεόραση
- Ραδιόφωνο
- Έντυπα διαφημιστικά φυλλάδια
- Άλλους ΔΤ υψηλής επισκεψιμότητας
- Δεν χρησιμοποιήθηκε κάποιο μέσο για προβολή
- Άλλο

23. Διατηρούνται τα στοιχεία των συναλλαγών σε log files ώστε να είναι δυνατή η επιβεβαίωσή τους;

Ναι

Όχι

Δεν γνωρίζω

24. Τα συστήματα (servers) αποθήκευσης του περιεχομένου και των δεδομένων των ηλεκτρονικών υπηρεσιών είναι διαφορετικά από το σύστημα που λειτουργεί ο ΔΤ σας (web server);

- Ναι
- Όχι
- Δεν γνωρίζω

25. Σε περίπτωση παροχής ηλεκτρονικών υπηρεσιών, ικανοποιούνται από τον φορέα σας, οι απαιτήσεις του Ν.2472/1997 για τη συλλογή, τη χρήση, την αποθήκευση και την προστασία των προσωπικών δεδομένων;

Δεν συλλέγονται προσωπικά δεδομένα

Τηρούνται οι απαιτήσεις του Νόμου

Δεν τηρούνται ακόμη οι απαιτήσεις

Δεν γνωρίζω

25.α Σε περίπτωση που η απάντηση στο προηγούμενο ερώτημα είναι ναι, κατά την παροχή ηλεκτρονικών υπηρεσιών από τον φορέα σας, γίνεται κατηγοριοποίηση των δεδομένων που αξιοποιεί / επεξεργάζεται η συγκεκριμένη υπηρεσία, σε προσωπικά, ευαίσθητα, οικονομικά δεδομένα;

Ναι

Όχι

Δεν γνωρίζω

26. Για κάθε ηλεκτρονική υπηρεσία που παρέχεται από τον φορέα σας υπάρχει λεπτομερής αποτύπωση της ροής εργασιών, η διαγραμματική της απεικόνιση, η συμπλήρωση των κατάλληλων μεταδεδωμένων και η περιγραφή των εγγράφων που απαιτούνται για την ολοκλήρωσή της σύμφωνα με τις απαιτήσεις του Πλαισίου Διαλειτουργικότητας;

Ναι

Όχι

Δεν γνωρίζω

27. Έχει γίνει για κάποια υπηρεσία που παρέχει ο φορέας σας, ανασχεδιασμός διαδικασιών ώστε να καταστεί πιο αποτελεσματική και αποδοτική;

Ναι

Όχι

Δεν γνωρίζω

28. Έχει οριστεί στέλεχος του φορέα σας ως Επιχειρησιακός Υπεύθυνος για κάθε ηλεκτρονική υπηρεσία που παρέχεται από τον φορέα προς πολίτες επιχειρήσεις ή άλλους φορείς;

Ναι

Όχι

Δεν γνωρίζω

29. Υπάρχει διαλειτουργικότητα εφαρμογών του ΔΤ σας με άλλους Κεντρικούς Διαδικτυακούς Τύπους (ΚΔΤ) όπως ΔΙΑΥΓΕΙΑ, e-procurement ή ΓΓΠΣ ή ΔΤ άλλων φορέων;

• Όχι

• Δεν γνωρίζω

• Ναι

•

30. Παρέχει ο φορέας σας σύνθετες υπηρεσίες σε συνεργασία με άλλους φορείς της δημόσιας διοίκησης, με στόχο τις ηλεκτρονικές υπηρεσίες μιας στάσης (one stop shop);

Ναι

Όχι

Δεν γνωρίζω

31. Σε περίπτωση που η απάντηση είναι ναι, έχετε συνάψει με τους άλλους δημόσιους φορείς συμφωνίες για τους όρους συνεργασίας, με τελικό στόχο την καλύτερη και ποιοτικότερη εξυπηρέτηση των αποδεκτών των υπηρεσιών;

Ναι

Όχι

Δεν γνωρίζω

32. Είναι δυνατή η πραγματοποίηση οικονομικών ηλεκτρονικών συναλλαγών μέσα από τον ΔΤ του φορέα σας;

Ναι

Όχι

Δεν γνωρίζω

33. Καταχωρούνται μεταδεδομένα για το περιεχόμενο του ΔΤ σύμφωνα με τα πρότυπα και τις προδιαγραφές του σχετικού παραρτήματος του ΠΗΔ;

Ναι

Ναι και μπορούν να εξαχθούν σε μορφή XML για χρήση από άλλους ΔΤ

Όχι

Δεν το γνωρίζω

34. Εφαρμόζετε κάποια μέθοδο μοντελοποίησης υπηρεσιών ή διαδικασιών όπως BPMN ή UML;

Ναι

Όχι

Δεν γνωρίζω

35. Για την περιγραφή της δομής των δεδομένων χρησιμοποιείτε σχήματα XML (XML schemas) που συμμορφώνονται με την προδιαγραφή XML Schema Definition (XSD) v1.0;

- Ναι
- Όχι
- Δεν γνωρίζω

36. Για την περιγραφή των μεταδεδομένων των ιστοσελίδων των υπηρεσιών και των εγγράφων χρησιμοποιείται το πρότυπο Dublin Core;

- Ναι
- Όχι
- Δεν γνωρίζω

37. Για τις σημασιολογικές απεικονίσεις (οντολογίες) χρησιμοποιείται το πρότυπο απεικόνισης OWL (Web Ontology Language);

- Ναι
- Όχι
- Δεν γνωρίζω

38. Χρησιμοποιεί ή αναπτύσσει ο φορέας σας λογισμικό Ανοικτού Κώδικα ή Ελεύθερο Λογισμικό για υπηρεσίες που παρέχονται από τον φορέα σας, στο backoffice (πχ πρωτόκολλο, εφαρμογή δημοτολογίου, εφαρμογή για την οικονομική υπηρεσία κ.α.);

- Ναι μόνο εφαρμογές γραφείου (πχ libre office)
- Ναι χρησιμοποιούμε κάποιες για το backoffice
- Ο φορέας μας αναπτύσσει λογισμικό ανοικτού κώδικα για υποστήριξη του backoffice
- Πρόκειται να γίνει άμεσα χρήση λογισμικού ανοικτού κώδικα
- Όχι
- Άλλο

39. Ο Φορέας σας έχει πολιτική ανοικτών δεδομένων (Δημοσιοποίηση δεδομένων χρήσιμων στους πολίτες, επιχειρήσεις, άλλους δημόσιους φορείς (<http://www.data.gov.gr/>))

Ναι

Όχι

Δεν γνωρίζω

40. Σε περίπτωση που οι πιο πολλές από τις παραπάνω απαντήσεις σας ήταν αρνητικές, ποιος θεωρείτε ότι είναι ο λόγος ή οι λόγοι; (δυνατότητα πολλαπλής απάντησης)

- Έλλειψη χρόνου
- Έλλειψη ενημέρωσης για το Πλαίσιο Ηλεκτρονικής Διακυβέρνησης
- Έλλειψη προσωπικού
- Έλλειψη εκπαίδευσης από το ΕΚΚΔΑ
- Άλλο

Δ ΠΡΟΤΑΣΕΙΣ ΒΕΛΤΙΩΣΗΣ

NOMIKEΣ

1 Θεωρείτε ότι η προσφάτως εγκριθείσα ελληνική νομοθεσία ισχύει στο πλαίσιο;

- ΝΑΙ
- ΟΧΙ
- Δεν γνωρίζω
- Εάν ΟΧΙ, μπορείτε να αναφέρετε παραδείγματα;

2 Θεωρείτε ότι οι ευρωπαϊκές οδηγίες εφαρμόζονται στο πλαίσιο;

- NAI
- OXI
- Δεν γνωρίζω
- Εάν OXI, μπορείτε να βρείτε παραδείγματα;

3 Προτείνετε άλλες ειδικές νομικές κατευθυντήριες γραμμές και συστάσεις για την επικαιροποίηση του πλαισίου;

- NAI
- OXI
- Δεν γνωρίζω
- Εάν NAI, μπορείτε να βρείτε παραδείγματα;

4 Γνωρίζετε κάποιο μοντέλο διακυβέρνησης που θα μπορούσε να εφαρμοστεί στο πλαίσιο;

- NAI
- OXI
- Δεν γνωρίζω
- Εάν OXI, μπορείτε να υποβάλετε προτάσεις;

5 Γνωρίζετε ομάδες διαλειτουργικότητας ανά τομέα για τον χειρισμό των συγκεκριμένων θεμάτων της διαλειτουργικότητας;

- NAI
- OXI
- Δεν γνωρίζω
- Εάν NAI, μπορείτε να βρείτε παραδείγματα;

6 Πιστεύετε ότι είναι σημαντικό να δημιουργηθούν τέτοιες ομάδες;

- NAI
- OXI
- Δεν γνωρίζω

7 Γνωρίζετε νομικές και οργανωτικές συμφωνίες μεταξύ των διαδικασιών απλούστευσης και διαλειτουργικότητας; Για παράδειγμα, οι δραστηριότητες του νέου προτεινόμενου προγράμματος για την απλούστευση των διαδικασιών.

- NAI
- OXI
- Δεν γνωρίζω
- Εάν NAI, μπορείτε να βρείτε παραδείγματα;

Οργανωτικές

8 Μπορείτε να αναφέρετε παραδείγματα κατάλληλων πόρων για το συντονισμό, την οργάνωση και την παρακολούθηση της διαλειτουργικότητας;

- NAI
- OXI
- Δεν γνωρίζω
- Εάν NAI, μπορείτε να βρείτε παραδείγματα;

9 Θεωρείτε ότι είναι σημαντικό να παρακολουθείται η προσέγγιση των υπηρεσιών της Ευρωπαϊκής Ένωσης; Για παράδειγμα, για την ευθυγράμμιση και εφαρμογή με άλλα εθνικά πλαίσια διαλειτουργικότητας; Συντελεστής από 1 έως 5.

- 1 Πάρα πολύ
- 2 Πολύ
- 3 Μέτρια
- 4 Ελαφρώς

5 Καθόλου

10 Γνωρίζετε οποιεσδήποτε διασυνδέσεις Επιχειρησιακής Διαλειτουργικότητας (BII) μέσω των οποίων θα είναι σε θέση να διαλειτουργούν οι επιχειρηματικές τους διαδικασίες;

- NAI
- OXI
- Δεν γνωρίζω
- Εάν NAI, μπορείτε να βρείτε παραδείγματα;

Τεχνικές

11 Πόσο σημαντικές είναι οι ειδικές αρχιτεκτονικές για την ηλεκτρονική ταυτότητα (eID), τις υπηρεσίες εμπιστοσύνης και την αρχήν μόνον άπαξ Once-Only, στο πλαίσιο; Συντελεστής από 1 έως 5.

Με βάση την αρχή «Μόνον άπαξ», δηλαδή την αρχή ότι «οι πληροφορίες και τα δεδομένα που υποβάλλονται σε δημόσιες αρχές δεν χρειάζεται να υποβάλλονται εκ νέου, δεδομένου ότι τα δεδομένα που υποβάλλονται σε φορέα μπορούν να προέρχονται από άλλο», για κάθε δημόσια διοίκηση έχει την ευθύνη να διατηρεί τα δεδομένα της και να είναι διαθέσιμη μέσω online υπηρεσιών προς άλλες δημόσιες τομεακές αρχές (PSAs).

- 1 Πάρα πολύ
- 2 Πολύ
- 3 Μέτρια
- 4 Ελαφρώς
- 5 Καθόλου

12 Θεωρείτε ότι το πλαίσιο θα πρέπει να λάβει υπόψη τις συνιστώσες διαλειτουργικότητας που έχουν αναπτυχθεί από την Ευρωπαϊκή Επιτροπή, όπως τα δομικά στοιχεία του CEF («Συνδέοντας την Ευρώπη»), όπως το πλαίσιο «Broker», τα «eArchiving, eDelivery, eDelivery, eID, eInvoicing και eTranslation») και να καθορίσει σε εθνικό επίπεδο συγκεκριμένες συνιστώσες διαλειτουργικότητας για την εκμετάλλευση των συστημάτων του ελληνικού δημόσιου τομέα; Συντελεστής από 1 έως 5.

- 1 Πάρα πολύ
- 2 Πολύ
- 3 Μέτρια
- 4 Ελαφρώς
- 5 Καθόλου

13 Μπορείτε να αναφέρετε ποιες λύσεις του ISA² (https://ec.europa.eu/isa2/solutions_en) και του CEF (<https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/CEF+Digital+Home>) πρέπει να ξαναχρησιμοποιηθούν και γιατί; (όπως EIRA, IMAPS, CAMSS, IQAT eTranslation, Broker, eDelivery κ.λπ.).

14 Η θέσπιση κοινής διαδικασίας για την υλοποίηση και την ενορχήστρωση των διαδικτυακών υπηρεσιών θα πρέπει να αποτελεί προϋπόθεση;

- NAI
- OXI
- Δεν γνωρίζω

15 Σε επίπεδο “front office”, ποιες είναι οι πτυχές τεχνικής διαλειτουργικότητας που θα πρέπει να εξετάζονται για τους ακόλουθους τομείς:

- 1 Παρουσίαση και ανταλλαγή δεδομένων
- 2 Προσβασιμότητα,
- 3 Αρχές σχεδιασμού διεπαφών

- 4 Πρόσβαση μέσω πολλαπλών διαύλων
- 5 Σύνολα χαρακτήρων
- 6 Συλλογική σύνταξη
- 7 Τύπος αρχείου και μορφότυποι εγγράφων και συμπίεση αρχείου
- 8 Άλλα;
- 9 Δεν γνωρίζω

16 Σε επίπεδο οργανωτικής υποστήριξης “back office”, ποιες είναι οι πτυχές τεχνικής διαλειτουργικότητας που θα πρέπει να εξετάζονται για τους ακόλουθους τομείς:

- 1 Ενσωμάτωση δεδομένων και ενδιάμεσο λογισμικό
- 2 Πρότυπα βασισμένα σε XML
- 3 Πρότυπα που βασίζονται στην τεχνητή νοημοσύνη
- 4 Διαδικτυακές υπηρεσίες
- 5 Αρχιτεκτονική αποκεντρωμένης εφαρμογής (distributed Application Architecture)
- 6 Υπηρεσίες διασύνδεσης
- 7 Πρωτόκολλα διαβίβασης αρχείων και μηνυμάτων
- 8 Μεταφορές και ασφάλεια μηνυμάτων
- 9 Υπηρεσίες αποθήκευσης μηνυμάτων
- 10 Πρόσβαση στην ηλεκτρονική θυρίδα
- 11 Υπηρεσίες καταλόγου και ονομάτων τομέα
- 12 Υπηρεσίες δικτύου
- 13 Άλλες
- 14 Δεν γνωρίζω

17 Ποιες είναι οι πτυχές που πρέπει να ληφθούν υπόψη στον τομέα της ασφάλειας;

- 1 Υπηρεσίες ασφάλειας
- 2 Γενικές υπηρεσίες ασφάλειας
- 3 PKI
- 4 Ασφάλεια δικτυακών υπηρεσιών
- 5 Τείχη προστασίας
- 6 Προστασία κατά των ιών
- 7 Σκώληκες
- 8 Δούρειοι ίπποι
9. βόμβες ηλεκτρονικού ταχυδρομείου
- 10 Άλλες
- 11 Δεν γνωρίζω

Σημαιολογικές

18 Ποια είναι τα βασικά λεξιλόγια Δεδομένων που θα πρέπει να αναπτυχθούν;

19 Ποια είναι τα βασικά λεξιλόγια Δεδομένων που θα θέλατε να εφαρμόσετε;

20 Ποια είναι τα κοινά υποδείγματα XML για τα δημόσια έγγραφα που ανταλλάσσονται οι πληροφορίες, λαμβανομένων υπόψη των βασικών δεδομένων που έχουν συμφωνηθεί για την ηλεκτρονική διακυβέρνηση;

Άλλες

21 Θεωρείτε ότι η εκπαίδευση και η κατάρτιση για τη διαλειτουργικότητα θα πρέπει να είναι υποχρεωτικές;

- ΝΑΙ
- ΟΧΙ
- Δεν γνωρίζω
- Εάν ΝΑΙ, μπορείτε να διευκρινίσετε τους λόγους

22 Ποια εκπαιδευτική μέθοδο προτιμάτε;

- Online μάθημα
- Συμμετοχή σε μια τάξη
- και τα δύο
- την παροχή υποστηρικτικών εκπαιδευτικών εγγράφων και εκπαιδευτικών πόρων
- Όλα
- Κανένα

23 Θεωρείτε αναγκαίο τον έλεγχο συμμόρφωσης του πλαισίου ηλεκτρονικής διακυβέρνησης του πλαισίου ηλεκτρονικής διακυβέρνησης για τις δημόσιες διοικήσεις;

- ΝΑΙ
- ΟΧΙ
- Δεν γνωρίζω
- Εάν ΝΑΙ, μπορείτε να διευκρινίσετε τους λόγους

24 Θεωρείτε ότι θα πρέπει να προστεθούν στο πλαίσιο συστάσεις για το διαδίκτυο των πραγμάτων, την τεχνητή νοημοσύνη, την εξόρυξη κειμένων και την εξόρυξη δεδομένων, τα συνδεδεμένα δεδομένα και τις τεχνολογίες blockchain που μπορούν να εφαρμοστούν από τις δημόσιες διοικήσεις;

- ΝΑΙ
- ΟΧΙ
- Δεν γνωρίζω
- Εάν ΝΑΙ, μπορείτε να προτείνετε συστάσεις;

25 Θεωρείτε ότι πρέπει να προστεθεί στο πλαίσιο η καθοδήγηση για τη χρήση των μέσων κοινωνικής δικτύωσης;

- ΝΑΙ
- ΟΧΙ
- Δεν γνωρίζω
- Εάν ΝΑΙ, μπορείτε να διευκρινίσετε τους λόγους και να προτείνετε συστάσεις;

—

Τέλος του ερωτηματολογίου

III. List of Organisations

Table 6: Annex: List of Organisations

ACRONYM	ORGANISATION
ISA, ISA ²	Interoperability solutions for public administrations, businesses and citizens (ISA programme of EC from 2010-2015 and ISA ² programme of EC from 2016-2020)
IDABC	Interoperable Delivery of European eGovernment Services to public Administrations, Businesses and Citizens
IDA	Interchange of Data between Administrations.
EC	European Commission
EU	European Union
CEF	Connecting Europe Facility Programme of EC
DGRC	Digital Governance Research Centre
DPIDG	Public Institutions and Digital Government
OECD	Organisation for Economic Co-operation and Development
UN	The United Nations
UNU	United Nations University
DESA	United Nations Department of Economic and Social Affairs
EIPA	European Institute of Public Administration
OPSI	Public Sector Innovation of OECD

IV. List of Terminology (EN-EL)

Table 7: Annex: List of Terminology (EN-EL)

ACRONYM	GLOSSARY in English	Glossary in Greek
IOP	Interoperability	Διαλειτουργικότητα
ICT	Information and communications technology	Τεχνολογία Πληροφοριών και Επικοινωνιών
EIF	European Interoperability Framework	ΕυΠΔ-Ευρωπαϊκό Πλαίσιο Διαλειτουργικότητας
EIFs	European Interoperability Frameworks	ΕυΠΔ- Ευρωπαϊκά Πλαίσια Διαλειτουργικότητας
eGIF	eGovernment Interoperability Greek Framework	ΕλΠΔ-Εθνικό Πλαίσιο Διαλειτουργικότητας και Ηλεκτρονικής Διακυβέρνησης
eGov	eGovernance	Ηλεκτρονική Διακυβέρνηση
eGov or eGovern	eGovernment electronic Government	Ηλεκτρονική Διοίκηση
NIF	National Interoperability Framework	ΕΘΠΔ- Εθνικό Πλαίσιο Διαλειτουργικότητας

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NIFs	National Interoperability Frameworks	ΕΘΠΑ- Εθνικά Πλαίσια Διαλειτουργικότητας
NIFO	National Interoperability Framework Observatory	Παρατηρητήριο Εθνικών Πλαισίων Διαλειτουργικότητας
MS	Member State	κράτη μέλη
PA	Public Administration	Δημόσια Διοίκηση
PS	Public services	Δημόσιες υπηρεσίες
DSM	Digital Single Market	Ενιαία Ψηφιακή Αγορά
BII	Business Interoperability Interfaces	Επιχειρησιακές Διεπαφές Διαλειτουργικότητας
EIRA	European Interoperability Reference Architecture and Cartography tool	Εργαλείο Αναφοράς Ευρωπαϊκής Αρχιτεκτονικής Διαλειτουργικότητας
IMAPS	Interoperability Maturity Assessment of a Public Service	Αξιολόγηση Ωριμότητας Διαλειτουργικότητας Δημοσίων Υπηρεσιών
CAMSS	Common assessment method for standards and specifications	Μέθοδος Αξιολόγησης για πρότυπα και προδιαγραφές
IQAT	Interoperability Quick Assessment Toolkit	Εργαλείο Σύντομης Αξιολόγησης Διαλειτουργικότητας
PSA	Public Sector Authority	Δημόσια Αρχή
eID	Electronic Identity	Ηλεκτρονική Ταυτοποίηση
BBs or DSI	Building Blocks or Digital Service Infrastructures (such as the CEF BBs: context broker, eArchiving, eDelivery, eID, eInvoicing, eSignature and eTranslation, Big Data Test Infrastructure)	Δομικά Στοιχεία (π.χ. τα δομικά Στοιχεία του CEF: διαμεσολαβητής περιεχομένων, Ηλεκτρονική Αρχαιοθήκη, Ηλεκτρονική παραλαβή, Ηλεκτρονική ταυτοποίηση, Ηλεκτρονική τιμολόγηση, ηλεκτρονικό υπόδειγμα υπογραφής, Ηλεκτρονική μετάφραση, Υποδομή Δοκιμών Μεγάλων Δεδομένων)
OOP	Once Only Principle	Αρχή Μόνον Απαξ
IoT	Internet of things	Διαδίκτυο των συσκευών
AI	Artificial Intelligence	Τεχνητή Νοημοσύνη
EGDI	E-Government Development Index	Δείκτης Ανάπτυξης Ηλεκτρονικής Διακυβέρνησης

V. About the Author

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Victoria Kalogirou is a Programme Manager for EU policies and a Seconded National Expert at the European Commission's Directorate-General for Informatics (Interoperability Unit – D2). She has substantial working experience in the area of eGovernment and eBusiness. In the Greek Ministry of Administrative Reform and eGovernance, she worked as ICT policy officer and ICT Programme Manager, where she collaborated with National and European Public Administrations and policy makers. She was also involved in – and coordinated – CIP and FP7 Large Scale Pilots, and participated in actions for implementation of digital government and innovation in the public sector from the Cabinet of the Minister and her Directorate, as an official.

Victoria holds a M.Sc. in Technology Education and Digital Systems, eLearning track from the Department of Digital Systems University of Piraeus, Greece and a BSc. in Information Technology from the Hellenic Open University. Her current thesis “Research in Interoperability Frameworks and eGovernment Policies for Public Sector: The case of Greece” is part of the MEng research and focuses on the Interoperability in National Public Administrations, Technologies and Management of Information and Communication Systems.at the Department of Information and Communication Systems Engineering University of the Aegean, Greece. Her research interests include, among others, eGovernment, interoperability, eLearning, digital transition in public administration and security awareness. More information: <https://www.linkedin.com/in/vickalogirou/>

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