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Introduction

This document constitutes the official deliverable D06.01 of the EIS Action Review Follow-up, as required by Task 6 of Specific Contract Nº439 under ABC III Framework Contract. This contract is performed in the context of 'Action 5.2 – European interoperability strategy governance support' of the ISA[2] Programme. One of the purposes of this action is to assess organisational structures for digital public services in the European Union.

This deliverable builds on deliverable 'D03.01: *Interoperability governance models* "of the same contract (SC439)[1]. It is a continuation of the report published last year under SC288 EIS Action Review Follow-up, D05.02 *Organisational Interoperability Guidelines*[2]. This report analyses eight new Member States (Belgium, Denmark, Italy, Lithuania, Portugal, Poland, Norway, and Spain) to have 13 analysed Member States[3]. It therefore adds to the body of knowledge of collaborative governance and organisational interoperability by analysing additional countries, drawing lessons learned based on this analysis and updating the recommendations based on the new findings.

The structure of this report is as follows:

- Chapter 1 presents the context and background of this assessment based on the findings from the previous contract;
- Chapter 2 introduces the research method used to analyse and structure the data related to thirteen Member States (Belgium, Denmark, Estonia, Germany, Italy, Lithuania, the Netherlands, Norway, Portugal, Poland, Slovakia, Spain and the United Kingdom). The study team selected them to provide best practices and comparison of different governance structures considering the country size and level of maturity. EU institutions are not part of this analysis.
- Chapter 3 assesses the organisational structures that facilitate interoperability implementation following the defined research method. The study includes an investigation of the following elements in each of the selected countries:
    - Governance functions at both strategic and at tactical-operational levels. Their affiliation to particular institutional roles, within the overall governance structure for a digital public services and/or e-government strategy in a country, is also studied.
    - Organisational interoperability artefacts.
    - Repositories and other supportive measures to share interoperability artefacts.
- Chapter 4 derives lessons learned from the assessment.
- Chapter 5 presents organisational interoperability guidelines based on the findings presented in the previous chapters.

[1] Deliverable *03.01 Interoperability governance models*, of the Action 2016.33 EIS Governance support, ISA2 programme, as required in the specific contract No. 439 under the ABC III Framework Contract"

[2] Deliverable *05.02 Organisational interoperability guidelines*, of the EIS Action Review Follow-up, as required by task five of Specific Contract N°288 under ABC III Framework Contract.

[3] When we refer to Member States, we include also the EEA countries, like Norway.

1 Context and background

The European Interoperability Framework (2017)[4] describes organisational interoperability as the way in which public administrations align their business processes, responsibilities and expectations to achieve commonly agreed and mutually beneficial goals.

The EIF refers to “integrating or aligning business processes and relevant information exchanged" as well as to “meeting the requirements of the user community by making services available, easily identifiable, accessible and user-focused”.

D02.03 European organisational interoperability vision (SC117)[5] revised the EIF definition in 2015, which was used to update the definition above. Organisational interoperability encompasses the necessary strategic, tactical and operational enablers as well as the respective artefacts implementing these enablers. Chapter 2 further explains and exemplifies them.

As discussed, the provision of interoperability governance and respective supportive measures should complement the realisation of the proposed organisational interoperability vision specified in D02.03 European organisational interoperability vision, which is:

By 2020, citizens and businesses should benefit by interoperable user-centric digital public services, at national and EU level supporting the free movement of goods, persons and services throughout the Union.

Thus, the vision of Organisational Interoperability is that by 2020, the collaboration between public administrations at EU and national level will have reached a high level of maturity of interoperability. The provision of interoperable user-centric digital public services will function in a dynamic cross-border and cross-sector ecosystem, i.e. the business processes for collaborative public service provision are fully aligned, services are easily identifiable and orchestrated effectively, and they provide seamless interaction and data exchange among distinct legacy systems and distinct policy domains. This will therefore support the free movement of goods, persons and services throughout the Union.

Therefore, to assess the fulfilment of this vision, this report analyses the governance functions and provided strategic, tactical and operational enablers in thirteen Member States. It further proposes guidelines on how to facilitate interoperability implementation through introducing the right governance functions and organisational interoperability enablers and artefacts.

[4] COM(2017) 134, Annex 2 to the to the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions ‘European Interoperability Framework - implementation strategy’, Brussels, 23.3.2017

[5] This official deliverable is part of the previous Specific Contract No 117 under ABC III Framework Contract.

2 Research design

The project team collected secondary data (desk research) in order to assess organisational structures of digital public services, which facilitate interoperability implementation in Member States. The desk research embarked on the data collected in the e-government factsheets[6], the NIFO factsheets[7], and the Joinup platform to identify relevant artefacts for the study. In the first edition of this report in 2016, the project team further contacted the country representatives of the countries in scope to verify and complement the collected data. Such verification for the new eight countries could be done with later editions of this report[8]. The report covers 13 European countries (i.e. Belgium, Denmark, Estonia, Germany, Italy, Lithuania, the Netherlands, Norway, Portugal, Poland, Slovakia, Spain and the United Kingdom). The new countries are marked with a  sign.

The assessment is driven by the organisational interoperability model introduced in deliverable D02.03[9] and exemplified in the toolbox D02.04[10] from contract SC 117; the toolbox groups organisational structures of public service provisioning into strategic, tactical and operational enablers of organisational interoperability.

As the work and concepts of this study span over three different contracts, they will be referred through the study with their contract number. These are:

- SC117: European interoperability strategy Action Review;
- SC288: European interoperability strategy Action Review follow-up;
- SC439 (current contract): European interoperability strategy Governance Support.

Beside the analysis of the organisational interoperability enablers and corresponding artefacts, the document describes existing supporting measures, such as repositories in place for sharing organisational interoperability enablers, and the necessary governance functions facilitating the establishment, maintenance, and sustainability of interoperability. The project team exemplified them in the proposed Conceptual model of organisational interoperability, as seen on Figure 1. This completes the assessment of organisational structures.

[6] The e-government factsheets of 2017 were consulted. They are available online on https://joinup.ec.europa.eu/community/nifo/og_page/egovernment-factsheets.

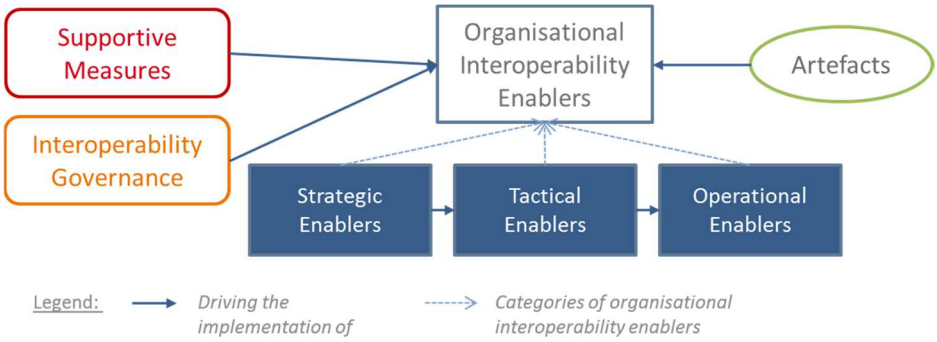
[7] The NIFO factsheet of 2017 were consulted. They are available online on https://joinup.ec.europa.eu/community/nifo/og_page/nifo-factsheets.

[8] Collecting primary data was not part of the scope of the current study. In contrast, in SC288 there were two deliverables for organisational interoperability, one of which involved the verification of the collected secondary data in *D05.01 Assessment of organisational structures of digital public services that facilitate interoperability implementation* from the e-government contact points of the studied countries and publishing it with updates and recommendations in *D05.02 Organisational interoperability guidelines*

[9] Deliverable D02.03 *European Organisational Interoperability Vision*, of the ISA Action 5.2 European Interoperability Strategy Governance Support, as required in the specific contract No. 117 under the ABC III Framework Contract.

[10] Deliverable D02.04 *Toolbox for European Organisational Interoperability, o*f the ISA Action 5.2 European Interoperability Strategy Governance Support, as required in the specific contract No. 117 under the ABC III Framework Contract.

Figure 1 Conceptual model of organisational interoperability



Source: deliverable D02.04 ''Toolbox for European organisational interoperability'' related to Specific Contract 117

Notes: conceptual model proposed on slide 4.

This assessment is organised in the following three steps.

- **Step 1 – Identification of organisational structures**

First, the project team identified organisational structures with particular responsibility to cater for the provision of relevant enablers and artefacts (i.e. governance functions, procedures, and relevant institutional roles) at all interoperability layers in a Member State. Besides facilitating the establishment, maintenance and sustainability of interoperability, these governance functions connect interoperability measures and solutions across the different interoperability layers. The project team studies the governance functions at country level. Thus, to assess the organisational structures that facilitate interoperability implementation and that provide guidelines in each country, the project team mapped the provided governance functions and the institution responsible for them to the two key levels of governance.

To illustrate these organisational structures, this report uses those introduced and used in deliverable D03.01 Interoperability governance models (SC439), which distinguishes between political, strategic, tactical and operational levels of governance. Our observation showed that in some cases the actors at political and strategic level coincide, and similar for the tactical and operational levels. Therefore, to align the levels to the terminology used for the organisational interoperability enablers and artefacts, the project team has merged the political and strategic level under the strategic level. Nevertheless, the political level is still part of the country governance schemas. Furthermore, the project team presents also the tactical and operational together for governance functions, and separate when discussing the organisational interoperability enablers and artefacts.

Their definitions are as follows:

- strategic level refers to long-term provision of and strategic responsibility for aligning the provided interoperability enablers and artefacts to the interoperability business and political goals; and
- tactical/ operational level refers to shorter-term operational provision of interoperability enablers and artefacts as well as execution of supportive measures.

Table 1 gives an example of governance functions in each of the two levels.

Table 1 Examples of governance functions in place in a country

Level of Governance	Governance functions	Responsible actor
Strategic	• Ensure alignment between interoperability business goals and interoperability solutions; • Provide guidance through the national interoperability framework (NIF);	Institutional body 1
Tactical/ operational	• Provide and maintain a repository for sharing and reusing generic interoperability artefacts; • Provide and maintain a catalogue of services and a catalogue of standards. • Prepare and implement change management functions on enablers and artefacts; • Trigger supportive measures as needed to ensure effective use of interoperability artefacts and to improve interoperability solutions; • Monitor interoperability maturity and the achievement of interoperability goals; • Create awareness and strengthen widespread interoperability promotion.	Institutional body 2

Interoperability governance functions also need to be integrated with public service provisioning. They help align the strategic interoperability objectives with the concrete implementations of interoperability solutions in end-to-end digital public services within and across respective policy domains. Such functions should naturally be part of well-established project management, architecture, and governance frameworks[11].

- **Step 2 – Description of available enablers and artefacts**

After introducing the governance functions allocated for strategic and tactical/operational levels with their corresponding organisational enablers and artefacts, the report describes a sample of generic interoperability enablers and artefacts using the template shown in Table 2[12]. The focus is on artefacts in place that represent organisational interoperability enablers in selected Member States. When the desk research does not find any artefacts, the third column indicates "no artefact found".

Table 2 Template for analysing organisational interoperability enablers and artefacts

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
Strategic enablers	Strategy	*<name>* • *<short description>*
Tactical enablers	Framework / Reference architecture	*<name>* • *<short description>*
	Programme	*<name>* • *<short description>*
	Agreement	*<name>* • *<short description>*

[11] This relationship has been be further studied within deliverable D04.03 – "*Public Service Governance Models and Guidelines*" (SC288), as well as D04.01 "Public Service Governance Models and Guidelines" (SC439).

[12] Governance functions were initially introduced and described in D02.01. "*Organisational Interoperability Implementation Review*" and D02.03. "*European organisational interoperability vision*" from SC117 EIS Action review. Some (adjusted) descriptions are included in D05.02 "*Organisational Interoperability Guidelines*" of SC288 and continued in the current deliverable for better comprehension.

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
	Service catalogue	*<name>* • *<short description>*
	Business capability	*<name>* • *<short description>*
	Guideline	*<name>* • *<short description>*
Operational enabler	Business process specification	*<name>* • *<short description>*
	Business information exchange/interaction pattern	*<name>* • *<short description>*

- **Step 3 – Recommendation of the required governance functions**

Once an inventory of generic interoperability enablers and artefacts is established, the project team recommends the required (desirable) governance functions that Member States should have in place to implement the overall interoperability strategy and to align their interoperability solutions with the overall strategy.

3 Assessment of organisational structures of digital public services that facilitate interoperability implementation

In the subsequent sections, the study assesses the organisational structures of digital public services for Belgium, Denmark, Estonia, Germany, Italy, Lithuania, the Netherlands, Norway, Portugal, Poland, Slovakia, Spain and the United Kingdom. Firstly, the assessment provides insights of the key governance bodies and legal grounds that form the framework of the actions and institutional structures facilitating interoperability implementation. Deliverable D03.01 of this contract (SC439)[13] introduced the overall organisational structures to govern the successful implementation of the interoperability objectives stressed in relevant policy documents. Therefore, the different figures only highlight the relevant actors responsible and/or accountable for the creation and maintenance of interoperability enablers and artefacts. Secondly, the assessment describes the key governance functions and the responsible institutional actors in the overall governance structure in each country. Finally, the report gives an overview of existing organisational interoperability enablers and artefacts, as well as repositories, already in place at country level.

The information for Estonia, Germany, Netherlands, Slovakia and United Kingdom was partially updated in this report.

3.1 Belgium

Being a federal state, Belgium displays a particularly decentralised public administration. Although the different governments tried to fight this division by signing an interoperability agreement in 2001, 2006[14] and 2013, the research found only few common interoperability artefacts and enablers. One of them is the Belgian Interoperability Framework (Belgif) which is a collaborative platform between different institutional levels, mapping EIF recommendations to interoperability initiatives, and providing a list of recommended ICT specifications.

As introduced in the deliverable D03.01 of this project (SC439), the Deputy Prime Minister and Minister for development Cooperation, Digital Agenda, Post and Telecom introduced the new Digital Belgium Action Plan 2015-2020 in 2015. It outlines the long-term digital vision for the country and translates it into clear ambitions, including improving overall interoperability and encouraging better usage of standards.

On the federal level[15], the DG Digital Transformation[16] from the FPS Policy and Support (BOSA) is a key player for the interoperability of the administration. Its tasks span across the strategic, tactical and operational level: it develops the strategy and the digital standards of the federal government, as well as provides assistance to all federal entities by supporting their ICT projects. The Crossroad Bank for Social Security has

[13] Specific Contract 439 under Framework Contract DI/07172 - ABCIII

[14] https://joinup.ec.europa.eu/community/epractice/document/be-intergovernmental-cooperation-agreement-integrated-egovernment

[15] Due to the various types of governance structures within the European Union, we will only consider the national (i.e. federal) level in the case of federal states and regional structures or enablers will be out of scope.

[16] Previously called “Fedict”.

also an important role and is the responsible department for the provision of organisational interoperability enablers and artefacts related to social security.

Figure 2 highlights the relevant actors responsible and/or accountable for the creation and maintenance of interoperability enablers and artefacts.

Figure 2 Governance Structure of Belgium

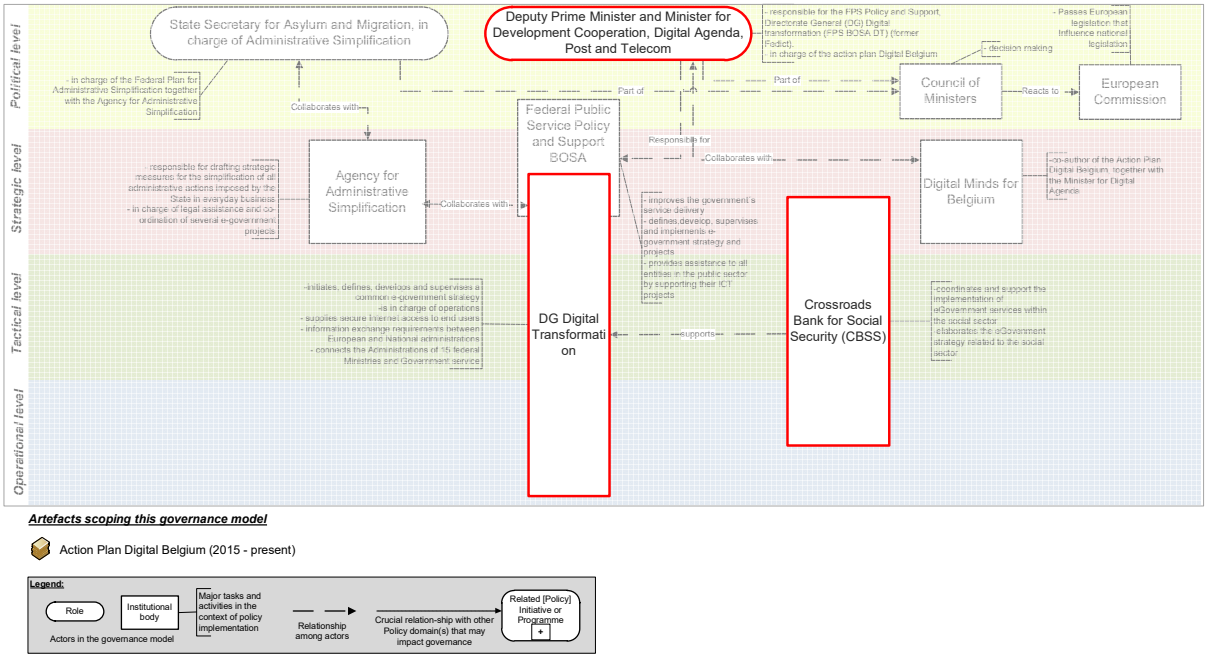


Table 3 shows particular governance functions executed by the aforementioned institutions.

Table 3 Governance Functions in Belgium

Level of Governance	Governance functions	Responsible actor
Strategic governance	• Develop the digitisation Action Plan for Belgium "Digital Belgium", including e-government and interoperability; • Supervise and hold political responsibility for the FPS Policy and Support (including the DG Digital Transformation)	Deputy Prime Minister and Minister for development Cooperation, Digital Agenda, Post and Telecom
	• Develop e-government strategy related to social security	Crossroad Bank for social security (CBSS)
	• Develop the strategy and the digital standards for the federal government	BOSA DG Digital Transformation
Tactical/ Operational governance	• Provide the national interoperability framework (Belgif); • Provide assistance to all federal entities by supporting their ICT projects; • Provide the national infrastructure such as the federal portal 'Belgium.be', the network FedMAN (Federal Metropolitan Area Network) and the Federal Service Bus (FSB) middleware.	BOSA DG Digital Transformation
	• Provide and maintain a repository for sharing and reusing generic interoperability artefacts related to social security	Crossroad Bank for social security (CBSS)

Table 4 gives an overview of existing generic organisational interoperability enablers in Belgium, identified through desk research and provided by the institutions identified above.

Table 4 Organisational interoperability enablers and artefacts in Belgium

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
Strategic enablers	Strategy	There is no dedicated interoperability strategy in Belgium. However, the following Action Plan and Strategy aim for the digitisation of the economy and the government and for the improvement of the government's interoperability as an indirect impact: • The Digital Belgium 2015-2020 Action Plan aims to conduct all communication from citizens and businesses with the government digitally by 2020 and to do so using a user-friendly channel. • The Federal Open Data Strategy 2015-2020 aims to publish federal data in machine-readable format with no or minimal restrictions for reuse, so that it can be used for commercial and non-commercial purposes.
Tactical enablers	Framework	• Belgian Interoperability Framework (Belgif)
	Programme	• The Only Once Programme offers support to the various federal public services to implement the "Only Once Act[17]".
	Agreement	• The Intergovernmental cooperation agreement of March 23, 2001 concerning the construction and operation of a common e-platform. • The Intergovernmental cooperation agreement of September 28, 2006, for an integrated e-government aims to share information and best practices in e-government among the different governments as well as to reuse e-government developments and services and to develop common actions such as the implementation of single identification keys. • The Cooperation Agreement of August 26, 2013 between the Federal, Regional and Community Authorities to harmonise and align initiatives to achieve an integrated e-government.
	Service catalogue[18]	• The Service catalogue for citizens and businesses as well as for public administrations on the FPS Policy and Support's website. • Business.belgium.be portal is the single point of contacts portal for Businesses providing a catalogue of services for businesses. • The Portal Social Security Catalogue provides information on all aspects of social security and access to several apps for citizens and businesses (such as Checkin @ work and Student @ work.)
	Business capability	• The G-Cloud: is a common platform for the federal public services and the social security, providing shared and fully managed solutions ranging from "Infrastructure as a Service" and "Storage as a Service" to "Platform as a Service" and "Software as a Service".

[17] According to the Only-Once Act of 5th May 2014, every federal government service must take into account the "Only Once" principle as of January 1, 2016 when retrieving data from citizens and businesses. The purpose is to avoid that citizens and businesses always share the same data while this information has already been communicated to another federal state administration.

[18] All the Regions and Communities have their own e-government Portals: be.brussels (Brussels-Capital Region), wallonie.be (Walloon Region), overheid.vlaanderen.be (Flemish Region and Flemish Community), federation-wallonie-bruxelles.be (Wallonia-Brussels Federation) and ostbelgienlive.be (German-speaking Community).

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
	Guideline	• No artefacts found
Operational enabler	Business process specification	• No artefacts found
	Business information exchange/interaction pattern	• The Federal Service Bus (FSB)[19] allows a simplified connection among the various applications and the Federal Administration's IT data files; • The Crossroad Bank for Social Security has developed an electronic network linking the various social security institutions for the exchange of information.

The FPS Chancellery of the Prime Minister and the FPS Policy and Support (BOSA) first launched the federal portal belgium.be in November 2002. Originally, it was both the institutional site of the Federal Government and an e-government portal providing a single and multilingual entry point to information and services provided by the Federal Government to citizens, businesses and civil servants. In 2008, the portal was simplified to improve interactions of citizens and businesses with the Administration. The information, available in Dutch, English, French and German, since then is displayed in a more user-friendly manner, according to the main life-events of both citizens and businesses, and a powerful search engine encompasses searches outside the portal. Users looking for a specific e-service can refine their search by theme, target group and/or level of government involved. A major section of the portal links to all the available public services online (e-services)[20]. Several of these e-services are secure and thus require authentication (site token or electronic ID card)[21].

Belgium also operates its own Interoperability Catalogue of assets on Joinup.eu. The Catalogue offers reusable solutions for the development of e-government services and includes core vocabularies, semantic and technical standards, open source software, reusable services and protocols. The Belgian Interoperability Catalogue functions as a repository for the Asset Description Metadata Schema (ADMS), which is a standardised metadata vocabulary schema that helps public administrations, standardisation bodies and other stakeholders to document their semantic assets in a uniform and structured manner (their name, their status, version, where they can be found on the Web, etc.). The purpose of common formats is to facilitate the interconnection of Belgian National Registers.

3.2 Denmark

Denmark has a long history of e-government strategies since the beginning of the 2000 and maintains this tradition with several very recent and up-to-date digital strategies such as the Digital Strategy 2016-2020 or the Strategy for Digital Welfare 2013-2020. However, Denmark does not limit its organisational

[19] More information on the features, the users, the requirements and the access to the FSB according to the type of data (personal, company, government) is available on the BOSA portal.

[20] Such as Tax-on-web, Biztax, Fatca, eBox, mypension.be etc.

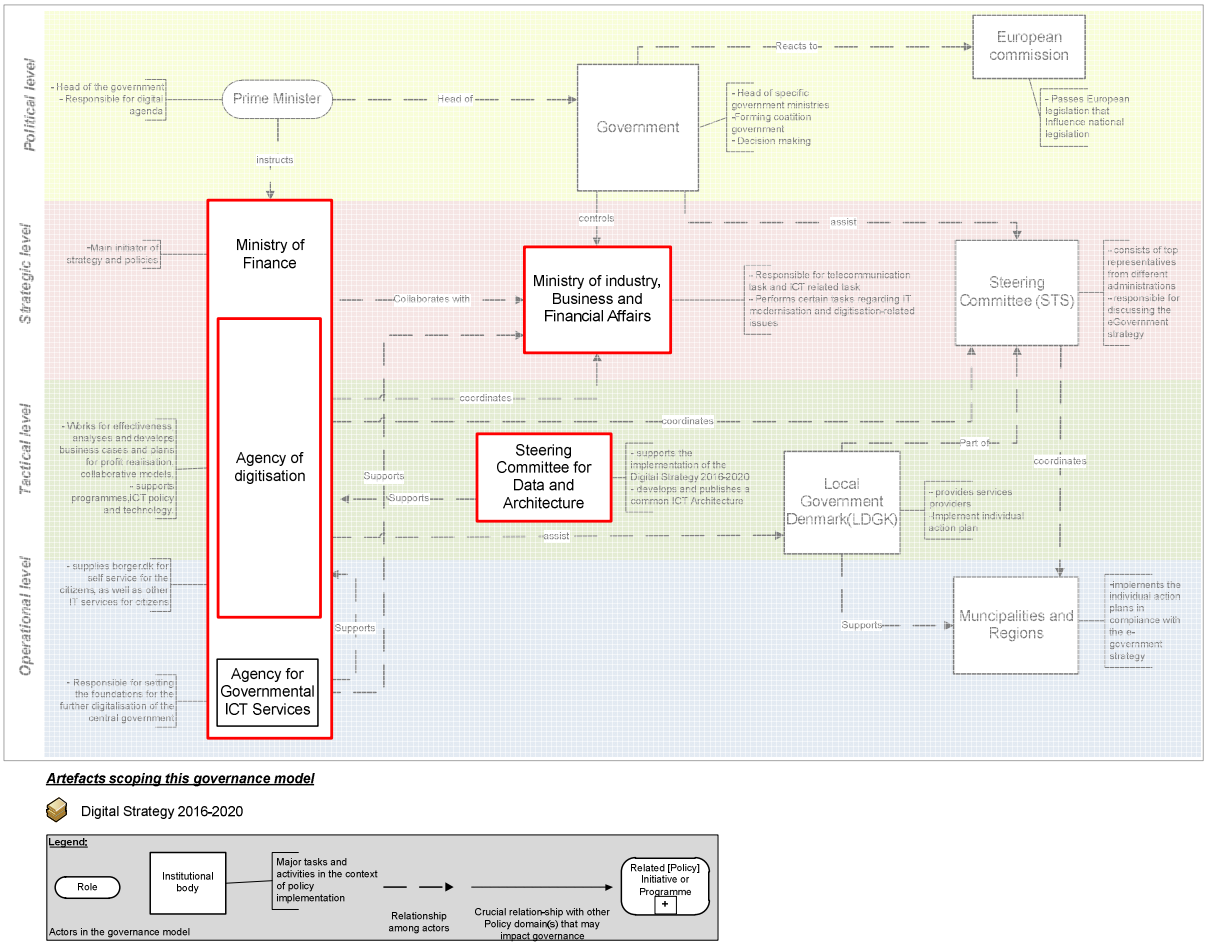
[21] Belgium's eGovernment factsheet 2017, p.30

interoperability artefacts and enablers to strategies, publishing frameworks (OIO), service catalogues for citizens and businesses and guidelines on ICT architecture.

From an institutional point of view, Denmark has more centralised approach to interoperability; the Agency for Digitisation being the motor behind almost all studied artefacts and enablers. The Agency is in charge of digitising Denmark and is responsible for implementing the government's ambition in the domain. The Agency however works under the supervision of the Ministry of Finance, which holds the political responsibility regarding e-government and the digitisation of the public sector. The Steering Committee for Data and Architecture also helps increase interoperability by publishing guidelines on ICT architecture.

Key actors with particular responsibility to cater for the organisational interoperability artefacts and enablers are depicted in Figure 3.

Figure 3 Governance Structure of Denmark



Artefacts scoping this governance model

Digital Strategy 2016-2020

To implement interoperability enablers and artefacts, Denmark's key actors execute a set of governance functions as shown in Table 5.

Table 5 Governance functions in Denmark

Level of Governance	Governance functions	Responsible actor
Strategic	• Hold political responsibility for the e-government strategy and digitisation of Denmark's public sector	Ministry of Finance
	• Initiate and develop the different Digital Strategies; • Run e-government strategies from concept to output; • Ensure alignment between interoperability business goals and interoperability solutions; • Coordinate the national e-government strategy and the Steering Committee for e-government strategy • Monitor interoperability maturity and the achievement of interoperability goals;	Agency for Digitisation
	• In coordination with the Ministry of Finance, responsible for the digital aspects of all policies related to the business environment (business regulation, intellectual property rights, competition and consumer policy etc.)	Ministry of Industry, Business and Financial Affairs
Tactical/ operational	• Provide the national interoperability framework (OIO) and guidance for its application • Trigger supportive measures as needed to ensure effective use of interoperability artefacts and to improve interoperability solutions; • Provide and maintain a repository for sharing and reusing generic interoperability artefacts; • Provide and maintain a catalogue of services and a catalogue of standards; • Prepare and implement change management functions on enablers and artefacts; • Create awareness and strengthen widespread interoperability promotion.	Agency for Digitisation
	• Develop and publish common ICT architecture • Provide guidance through the ICT architecture • Support the implementation of the Digital Strategy 2016-2020	Steering Committee for Data and Architecture

Table 6 provides an overview of existing generic organisational interoperability enablers in Denmark, which desk research identified.

Table 6 Organisational interoperability enablers and artefacts in Denmark

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
Strategic enablers	Strategy	There is no dedicated interoperability strategy in Denmark. However, the following strategies stress the importance of Interoperability for the digitisation of the public sector: • The Digital Strategy 2016-2020 addresses multiple themes such as the automation of public administrative procedures, a better user experience for citizens and business, digital welfare, data sharing, and others;

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
		• The Strategy for Digital Welfare 2013-2020 aims to accelerate the use of ICT and welfare technology[22] in frontline public service delivery; • The Open Government Partnership[23] Action Plan 2017-2019 the National Plan focuses on 4 themes: more and better open data, tailored data to ensure a basis for citizen participation, working together for a better public sector, a global effort for openness
Tactical enablers	Framework	• The National Interoperability Framework (OIO)[24] includes general principles as well as semantic and technical standards and common infrastructure solutions in operation both in government and in the private sector.
	Programme	• The Basic Data Programme aims to standardise all data from base registries in order to combine it and use it in a coherent way.
	Agreement	• The Agreement on the use of mandatory open standards for software in the public sector, which mandates the use of seven sets of open standards[25] for new ICT solutions for all governments.
	Service catalogue	• The borger.dk[26] is a single Internet entry point to the public sector's information and e-services for citizens, regardless of the public entity. The portal is jointly operated and funded by national, regional and local authorities and is managed by the Digital Agency for Digitisation[27]; • The Virk.dk is a single Internet entry point to the public sector's e-services for Businesses.
	Business capability	• No artefacts found
	Guideline	• The White Paper on a common public-sector digital architecture v.1.00 June 2017 defines the common ICT architecture to be used by public and private sector with 8 principles and 22 architectural rules; • The OIO architecture guide is set up to help Danish authorities and institutions as well as their suppliers to get an overview of common, cross-governmental principles, requirements, methodologies, models, standards, infrastructure, governance etc. in relation to digitisation – all helping to achieve the National Interoperability Framework (NIF). The OIO architecture is published on the collaboration platform Digitaliser.dk
Operational enabler	Business process specification	• No artefacts found

[22] Specifically, concrete initiatives and objectives in the strategy will speed up the use of efficient and effective digital and technological solutions in healthcare, care for the elderly, social services and education.

[23] The Open Government Partnership is an international initiative founded by the US government. The purpose of the initiative is to promote good governance, strengthen democracy, and utilise digital technology to improve society.

[24] Due to unknown technical reasons, the hyperlink does not open from itself when clicking on it. Please copy and paste the link in your web browser in order to have access to the information.

[25] The following set of mandatory standards entered into force on 1 January 2008 : Standards for data exchange between public authorities (OIOXML), Standards for electronic file and document handling (FESD), Standards for electronic procurement in the public sector (OIOUBL), Standards for digital signatures (OCES), Standards for public websites / homepages and accessibility, Standards for IT security (DS484 - only for the government sector) and Standards for document exchange (ODF/OOXML)

[26] or the English language citizens portal for foreigners living in Denmark: https://lifeindenmark.borger.dk/

[27] Denmark eGovernment factsheet 2017, p. 25

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
	Business information exchange/interaction pattern	• No artefacts found

Digitaliser.dk is the central repository of the Danish government and a tool for development, knowledge sharing, as well as a forum for the digitisation of Denmark. The portal aims to stimulate development and adoption of digital content and business models by utilising Web 2.0 technologies and public data and digital resources. It serves a double purpose: a central repository publishing instructions, software and operating information, as well as a forum to exchange experience and knowledge about public digitisation in Denmark.

3.3 Estonia

Although Estonia does not have an interoperability strategy as such, a wide range of organisational interoperability artefacts and enablers ensure the interoperability of its public administrations. Several frameworks dedicated to the interoperability of the Estonian information systems are in place, together with centralised service catalogues and agreements across the different institutions keep the ICT architecture harmonised. Table 8 provides an overview of these organisational interoperability artefacts and enablers.

Several institutions are accountable for the creation and maintenance of the aforementioned organisational artefacts and enablers:

The E-Estonia Council (formerly Estonian Informatics' Council) is among the strategic key actors in Estonia, which directs the development of the Estonian information society, e-government and e-governance and runs an interoperability expert group. It advises the Minister of Economic Affairs and Communications in matters related to digital society development on both national and global levels. This committee is also responsible for the implementation of the Estonian digital agenda. This further includes input for Estonian positions in European Union and other international organisations. It consists of representatives of governmental authorities and key private and third sector organisations. The Ministry of Economic Affairs and Communications also plays an important role on the strategical level as it provides the national interoperability framework (NIF) and ensures alignment between interoperability business goals and interoperability solutions.

On tactical/operational level, the Department of State Information Systems (RISO) of the Ministry of Economic Affairs and Communications, and the Estonian Information System Authority (RIA) are identified as being relevant actors to develop interoperability enablers:

- The Department of State Information Systems (RISO) coordinates the governmental ICT policy and information society policy. The department has a coordination role in these domains, but it is also responsible for the policy itself as well as its implementation;
- The Estonian Information System Authority (RIA) coordinates the development and management of information systems. It guides public service providers on how to manage their information systems as per requirements and monitors them. It maintains several systems, such as X-Road, the data

exchange layer of the state's information system (development and administration), the State information system (RIHA), and the electronic document exchange centre, as described above.

Figure 4 depicts the governance structure of Estonia highlighting responsible and/or accountable bodies for the creation and maintenance of interoperability enablers and artefacts.

Figure 4 Governance Structure of Estonia

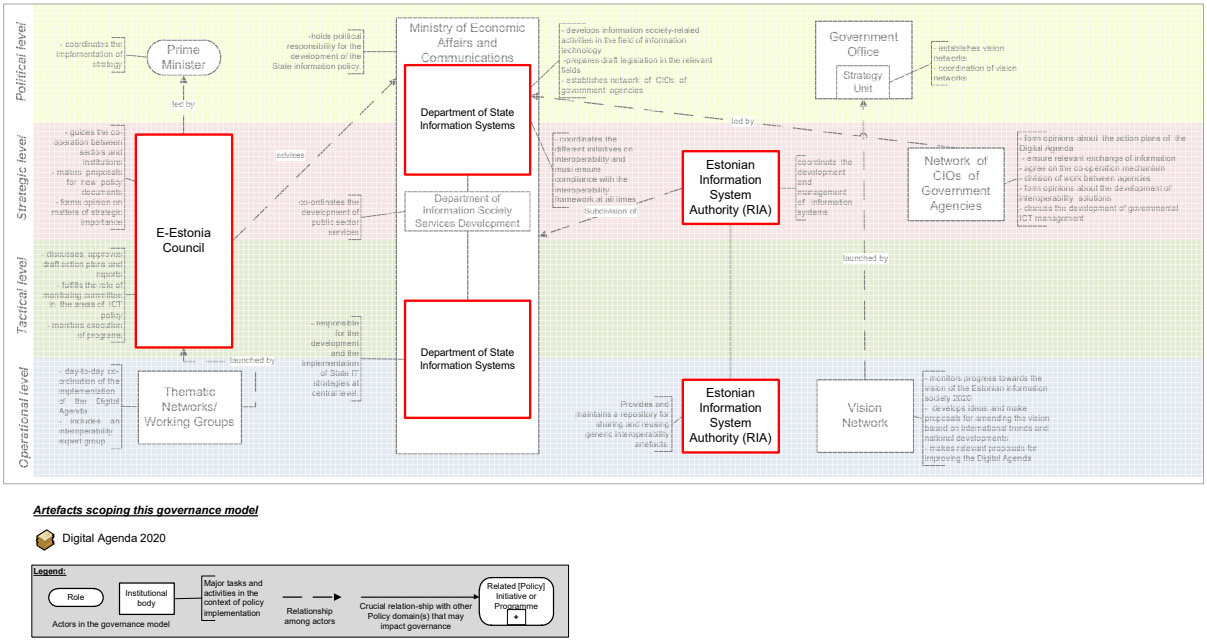


Table 7 shows particular governance functions executed by above institutions.

Table 7 Governance functions in Estonia

Level of Governance	Governance functions	Responsible actor
Strategic governance	• Make proposals for preparing policy documents (National Digital Agenda) to steer the development of a digital society; • Review and express opinions on relevant draft policy proposals related to the Estonian information society; • Act as the sectoral monitoring committee for the European Structural and Investment Funds (ESIF) measures in the ICT policy field. • Monitor the execution of programmes;	E-Estonia Council
	• Ensure alignment between interoperability business goals and interoperability solutions.	Ministry of Economic Affairs and Communications
Tactical/ Operational governance	• Provide the national interoperability framework (NIF);	Ministry of Economic Affairs and Communications
	• Maintain an interoperability expert group	E-Estonia Council
	• Responsible of the change management functions related to enablers and artefacts; • Provide and maintain a catalogue of services and a catalogue of standards; • Coordinate, implement and is responsible for the governmental ICT policy and information society policy.	RISO

Level of Governance	Governance functions	Responsible actor
	• Provide and maintain a repository for sharing and reusing generic interoperability artefacts; • Guide and monitor the public service providers on how to manage their information systems	RIA

Table 8 provides an overview of existing organisational interoperability enablers in Estonia, which the project team identified through desk research, and which the aforementioned institutions provide.

Table 8 Organisational interoperability enablers and artefacts in Estonia

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
Strategic enablers	Strategy	• There is no dedicated interoperability strategy in Estonia. However, the Digital Agenda 2020 for Estonia incorporates interoperability objectives along the digitisation of the public sector
Tactical enablers	Framework	• The Information Security Interoperability Framework; • Interoperability Framework of the State Information System.
	Programme	• No artefacts found
	Agreement	• Interoperability agreements are implemented for secure data exchange through the "State IT architecture"
	Service catalogue	• The Service search allows the search for services offered by the different ministries and by the institutions under their governance area; • Estonia is also providing a service catalogue (the Services A – Z) integrated within the official one-stop-government portal Eesti.ee ,which provides the central entry point for end users (citizens, businesses, officials) to public services.
	Business capability	• No artefacts found
	Guideline	• The Public sector business processes- Handbook of Process Analysis
Operational enabler	Business process specification	• No artefacts found
	Business information exchange/interaction pattern	• The Document exchange centre (DEC) – information system providing a common central document exchange service for various document management systems (DMS) as well as other information systems that handle documents; • The Data Exchange Layer X-Road - a technological and organisational environment enabling a secure Internet-based data exchange between information systems.

Regarding supporting measures, Estonian Information System's Authority (RIA) operates the RIHA (State information system - *Riigi Infosüsteemi Halduse Infosüsteem*)[28]: an Estonian catalogue of state information systems that aims to ensure their transparent and efficient management. It administers information systems, services, components, data models, and classifications of semantic and XML assets, operated by the state, by local governments or other legal persons performing public services[29]. RIHA eases the Estonian

[28] https://www.ria.ee/en/administration-system-of-the-state-information-system.html

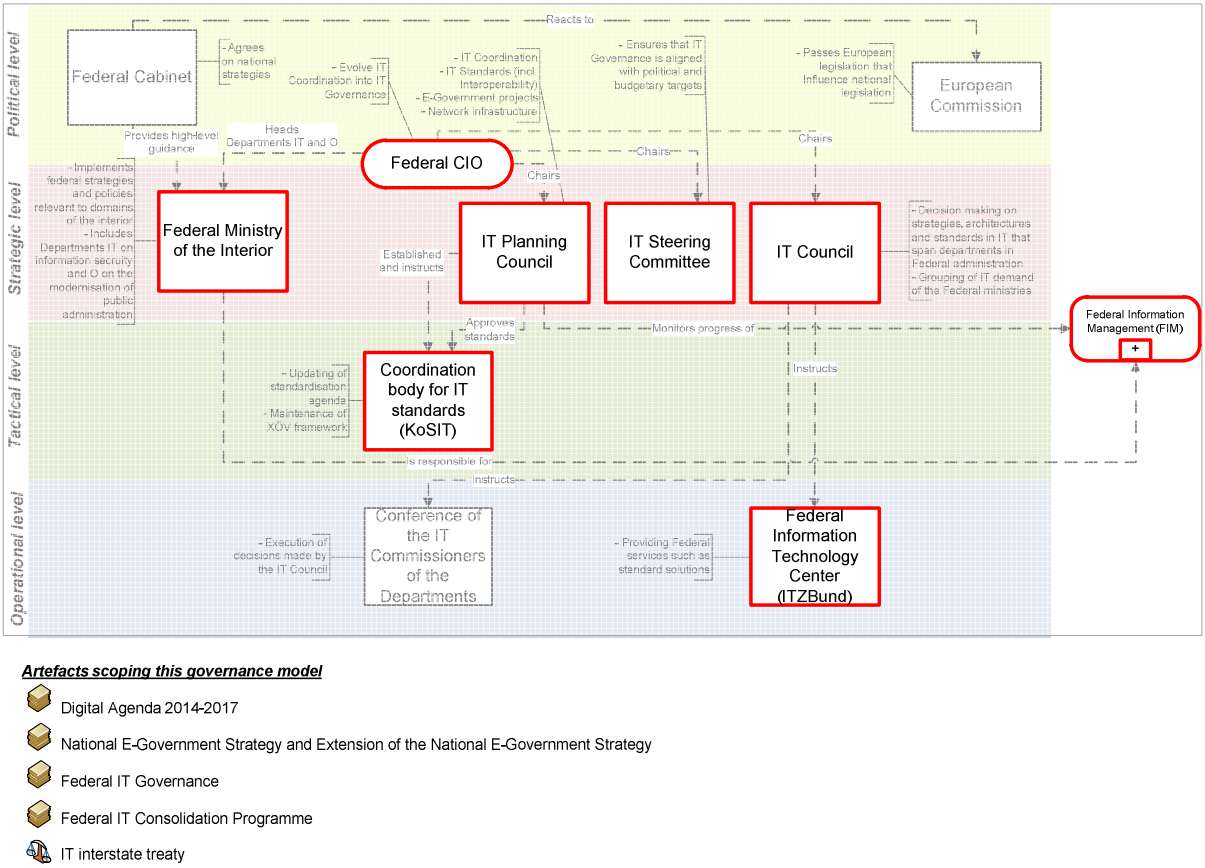
[29] https://www.mkm.ee/sites/default/files/estonian_et_-_chapter_0_english.pdf

information system planning and operation activities by providing complete and up-to-date metadata of Estonian public sector information systems. It supports the interoperability of databases, the re-use of data and the life-cycle management of information systems. The registration of public databases and information systems on RIHA is mandatory and enforced by law. While the information is publicly available, only organisations registered in RIHA can amend their databases to ensure and maintain their accuracy.

3.4 Germany

As already introduced in deliverable D03.01 of this project (SC439), Germany, a large country with a federal structure, has established basic enablers fostering interoperability and collaboration among relevant government actors to provide interoperable digital public services. These actors include the German Bundestag and the Federal Ministries, the State governments, as well as local authorities. The Article 91c of constitution of the Federal Republic of Germany *(Grundgesetz)* and the ICT interstate treaty (*IT-Staatsvertrag*) enforce the collaboration between the federal government and the state governments as well as the municipal level on ICT investments.

Figure 5 Governance Structure of Germany



Artefacts scoping this governance model

- Digital Agenda 2014-2017
- National E-Government Strategy and Extension of the National E-Government Strategy
- Federal IT Governance
- Federal IT Consolidation Programme
- IT interstate treaty

On strategic level, the ICT Planning Council is a main coordinating body to promote and monitor interoperability developments in the country. On tactical and operational level, the Coordination Office for ICT Standards (*Koordinierungsstelle für IT Standards* (KoSIT)), the Federal Information Management (FIM)

and the Federal Information Technology Center (ITZBund[30]) are relevant actors that develop organisational interoperability enablers. Figure 5, above, and Table 9, below, illustrate the additional relevant actors.

To implement interoperability enablers and artefacts, Germany's key actors execute a set of governance functions as shown in Table 9 .

Table 9 Governance functions in Germany[31]

Level of Governance	Governance functions	Responsible actor
Strategic governance	• Collaborate closely among the German Bundestag (Federal Parliament) and the Federal Ministries, the State governments and local authorities. In addition, collaborate closely with concerned stakeholders, such as civil society, industry and science, social partners to ensure effective achievement of the Digital Agenda objectives.	• Federal Ministries: BMI, BMWi, BMVI • ICT Planning Council • Cross-departmental "Digital Agenda" steering committee • National ICT Summit
	• Supervise and provide strategic direction regarding e-government developments in Germany, including interoperability; • Frequent reports of the CIO to the Minister on these developments.	• Federal Ministry of the Interior (BMI) • Federal CIO
	• Consultation with the ICT Council, the Conference of ICT Commissioners of the (Federal) departments and the Federal ICT Steering Committee to ensure coordination into the ICT Governance; • Develop strategies for e-government, ICT and ICT security, including interoperability; • Facilitate stakeholders' consultation and relevant decision-making at strategic level; • Monitor the governance related to the provision of central ICT infrastructure done by other bodies (e.g. ITZBund).	• Federal CIO
	• Decide on strategies, ICT architectures and standards that span across departments in the Federal government; • Strategic governance of the project 'Federal ICT consolidation'	• ICT Council
	• Approve the Federal ICT concept; • Initiate work requests towards the ICT Council; • Veto decisions of departments that are in contradiction with prior agreements of the ICT Steering Committee or the ICT Council; • Consult the relevant departments and provide recommendations on behalf of the ICT Council if that body cannot agree in specific matters.	• ICT Steering Committee (ICT Steuerungsgruppe des Bundes)
	• Identify the need for standards based on prioritisation of steering projects or coordination projects.	• ICT Planning Council
Tactical and operational governance	• Introduce (temporary) working groups according to needs (e.g. strategy steering, information security, European interoperability); • Delegate developing standards to KoSIT based on identified needs; • Approve standards developed by KoSIT.	• ICT Planning Council
	• Delegate development of architectures, standards and methods for Federal ICT to respective operative units in BMI or ITZBund.	• Federal CIO

[30] Due to unknown technical reasons, the hyperlink does not open from itself when clicking on it. Please copy and paste the link in your web browser in order to have access to the information

[31] Contents are taken from the entries in Deliverable D 03.01, which include relevant references.

Level of Governance	Governance functions	Responsible actor
	• Implement governance functions in accordance with the federal ICT-strategy to ensure achievement of the strategic objectives of the seven lines of actions defined in the Digital Agenda 2014-2017;	• ICT Council, • BMI project leadership team, • ITZBund
	• Develop standards that enable interoperability between administrative processes, across federal and state level as well as municipalities and users of public services (citizens, businesses, NGOs). This implies a 'translation' of legal terms into actionable and relevant process terms as well as a reduction of efforts in future interactive processes; • Ensure effective information (data) management and exchange with three key interoperability building blocks: services catalogue ("*Leistungskatalog*" (LeiKa)), classification and collection of a set of forms ("*FIM Formularsystem*"), classification of similar processes establishing a national process library ("*Nationale Prozessbibliothek*" (NPB)).	• FIM
	• Develop architectures, standards and methods for Information technology at federal level.	• Operative Units of BMI and inter-disciplinary working groups; • ITZBund
	• Provide and maintain a central IT infrastructure to ensure interoperability.	• ITZBund
Tactical and operational governance	• Coordinate the development and maintenance of interoperability and ICT standards; • Provide consultation and strategic aid to the ICT planning council in terms of knowledge sharing; • Provide operational support to the communal, state and federal level when developing, deploying and operating ICT standards; • Provide and maintain a repository of (publicly) available standards. • Update of standardisation agenda	• KoSIT

Table 10, below, provides an overview of existing organisational interoperability enablers and artefacts, which were identified through desk research in Germany.

Table 10 Organisational interoperability enablers and artefacts in Germany

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
Strategic enablers	Strategy	There is no dedicated interoperability strategy in Germany. However, the following strategies stress the importance of interoperability for the digitisation of the public sector[32]: • The Digital Agenda 2014 – 2017 issued by the Federal Government; • The Digital administration 2020 (*Digitale Verwaltung 2020*) issued by the Federal Government; • The National E-Government Strategy (NEGS) issued by the ICT Planning Council.

[32] See the entries on interoperability policies for Germany provided in Deliverable D 03.01, which include relevant references.

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
Tactical enablers	Framework	While there is no defined formal National Interoperability Framework, the following generic frameworks contribute to interoperable public service provisioning: • The SAGA 5.0 provides a technical framework for interoperability, which is mandatory when implementing software systems for the federal administrations; • The XÖV framework provides the underlying methods, tools, certification and releases management for developing standards.
	Programme	No explicit programmes fostering the implementation of the strategic objectives stated in above listed strategy documents could be found. However, the relevant actors (Federal Government, ICT Planning Council) seem to rely on projects, rather than programmes to achieve these objectives.
	Agreement	• No artefacts found
	Service catalogue	• The Service catalogue (*Leistungskatalog*) offers a unified and comprehensive list of administrative services provided by the federal, state and local authorities.
	Business capability	• The XÖV body of knowledge provided in the XÖV framework.
	Guideline	• The XÖV guidelines provided in the XÖV framework.
Operational enabler	Business process specification	• The KGSt® Reference process library (*Prozessbibliothek*) provides reference process models for different public services on municipal level.
	Business information exchange/interaction pattern	• Different business information exchange patterns exist that span across organisational, semantic and technical layers of interoperability such as: • The OSCI-Transport is a protocol standard for the secure, confidential and legally binding transmission of electronic data in the e-Government; • The De-Mail provides the basis for the simple, legally binding and confidential delivery of electronic documents and messages; • The XVergabe is a cross-platform data exchange and process standard between bidder clients and procurement platforms; • More examples exist as domain specific interaction patterns (e.g. XÖV standards) • The Portalverbund is a concept to enable the sharing of data among different government institutions at distinct federal levels in Germany. It is one of the core projects of the IT-Planning Council.

In Germany, different repositories exist to share interoperability artefacts, such as the following ones:

- The XRepository serves as central XÖV platform[33] for the distribution of standards and their operational use. This also includes the necessary data exchange artefacts such as code lists. KoSIT hosts and maintains the XRepository.
- The German Administration Services Directory[34](*Deutsches Verwaltungsdiensteverzeichnis* – DVDV) is a multidisciplinary and inter-administrative infrastructure component for the secure and

[33] XÖV standards are specifications for data exchange in public administration or between the public administration and its customers. KoSIT maintains the XÖV platform and XÖV framework.

[34] Due to unknown technical reasons, the hyperlink does not open from itself when clicking on it. Please copy and paste the link in your web browser in order to have access to the information.

reliable addressing of automated services and specialised procedures for communication between and with public administration authorities in Germany. ITZBund maintains the DVDV.

- The KGSt® reference process library (Prozessbibliothek) is a repository of reference business processes or best practice processes of municipal public service provisioning, which is hosted by the Kommunale Gemeinschaftsstelle für Verwaltungsmanagement (KGSt – a municipal coordination body on public management). Public servants of municipalities that are members of the KGSt can retrieve relevant reference process models on the basis that they provide a reference model themselves; hence actively ensuring sharing and reuse.

3.5 Italy

The Agency for Digital Italy (AgID) plays a central role in ensuring the interoperability of the Italian public administrations. In addition to being involved on the strategical level, ensuring alignment between interoperability goals and solutions throughout various artefacts (Italian Digital Agenda, National Agenda for the valorisation of public information patrimony), the agency also plays a major role on the operational and tactical levels, triggering supportive measures and providing a (limited) repository.

In addition, both the Ministry for Economic Development and the Ministry for Simplification and Public Administration share the responsibility for developing enablers and artefacts on the strategical level – as shown in Table 11.

Italy also takes part in various international initiatives such as the Open Government Partnership or the International Public Administration Network (RIPA).

Figure 6, below, depicts the governance structure of Italy highlighting responsible and/or accountable bodies for the establishment and maintenance of interoperability enablers and artefacts.

Figure 6 Governance Structure of Italy

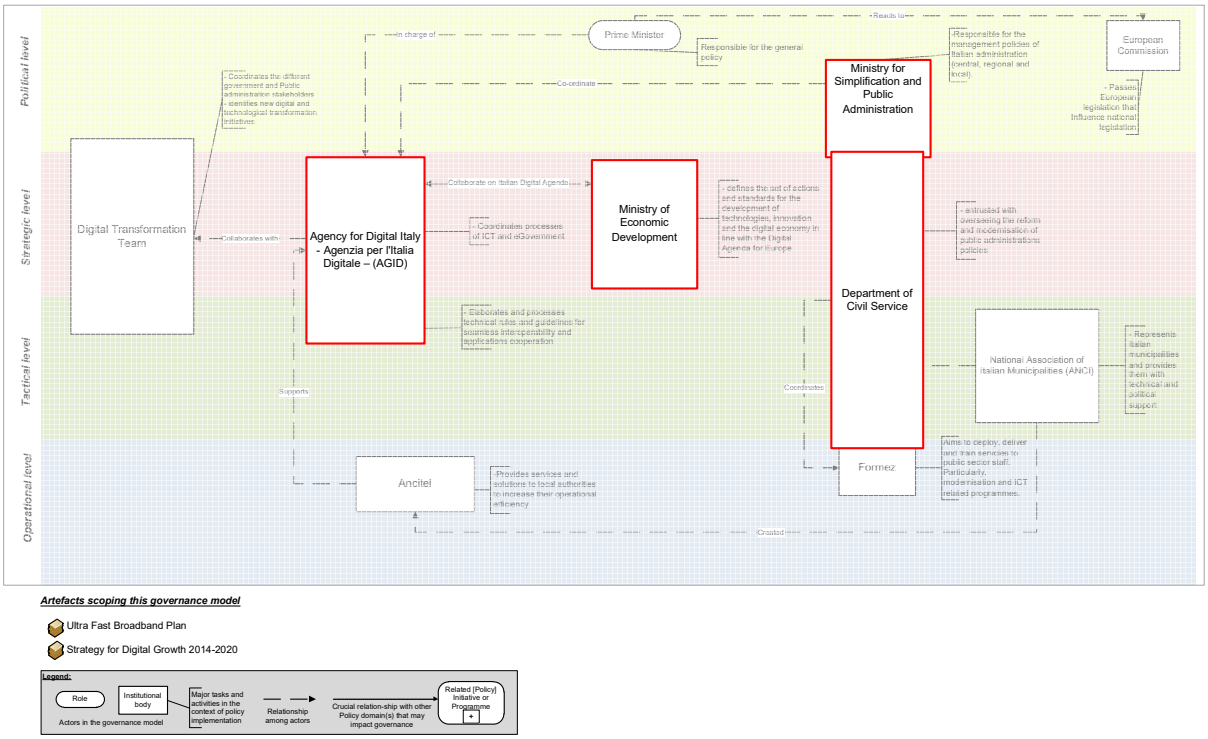


Table 11, below, shows particular governance functions executed by above institutions.

Table 11 Governance Functions in Italy

Level of Governance	Governance functions	Responsible actor
Strategic	• Co-responsible for the Italian Digital Agenda: defining the set of actions and standards for the development of technologies, innovation and the digital economy in line with the Digital Agenda for Europe.	Ministry of Economic Development; Ministry for Simplification and Public Administration
	• Co-responsible for the Italian Digital Agenda: defining the set of actions and standards for the development of technologies, innovation and the digital economy in line with the Digital Agenda for Europe; • Ensure alignment between interoperability business goals and interoperability solutions; • Coordinate actions in the field of information and communication technologies to promote innovation in support of public administration; • Elaborate and process the technical rules and guidelines for seamless interoperability and application's cooperation between governmental information systems and those of the EU.	Agency for Digital Italy
Tactical/ operational	• Run and maintain the knowledge management web platform, "Magellano", which is a virtual community for the Italian public administrations to share knowledge and expertise on different digitisation aspects (including interoperability) for the different stakeholders.	Ministry for Simplification and Public Administration
	• Provide the National Interoperability Framework; • Ensure technical uniformity of public information systems designed to deliver services to citizens and businesses; • Trigger supportive measures as needed to ensure effective use of interoperability artefacts and to improve interoperability solutions; • Monitor interoperability maturity and the achievement of interoperability goals; • Create awareness and strengthen widespread interoperability promotion; • Provide and maintain a (limited) repository for sharing and reusing generic interoperability artefacts.	Agency for Digital Italy

Table 12, below, provides an overview of existing organisational interoperability enablers and artefacts in Italy, which desk research identified.

Table 12 Organisational interoperability and artefacts in Italy

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
Strategic enablers	Strategy[35]	There is no dedicated interoperability strategy in Italy. However, the following strategies stress the importance of interoperability for the digitisation of the public sector:

[35] https://joinup.ec.europa.eu/sites/default/files/inline-files/eGovernment_in_Italy_March_2017_v3_0.pdf & https://ec.europa.eu/digital-single-market/en/scoreboard/italy

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
		• The Italian Digital Agenda which includes: the Digital Strategy for Growth 2014-2020 (strategy aimed to enable digitally-literate citizens and businesses, with the help of public levers) and the Ultra-Fast Broadband Plan • The Open Government Partnership Action Plan 2016-2018[36] contains 34 actions divided into 3 thematic areas: Open Data and transparency, participation and accountability and Digital citizenship and Innovation • The National Agenda for the valorisation of public information patrimony directs administrations towards a standardised and interoperable national data production and release system[37].
Tactical enablers	Framework / Reference architecture	• The Italian National Interoperability Framework consists of a legal framework (the Digital Administration Code) and an ICT interoperability framework (the Public Connectivity System (SPC))[38]
	Programme	• The National Operational Programme on Governance and Institutional Capacity[39] : the programme's priority (50% of the budget) is the modernisation of Italy's public administration to increase transparency, interoperability and access to public data. In addition, It will develop information and communication technologies to enhance online services and digital inclusion (12% of the budget), as well as reinforce multi-level governance (one third of the budget).
	Agreement	• Italy is a member of the International Public Administration Network (RIPA) which represents an agreement to participate in the international IP connectivity and therewith using interoperability services
	Service catalogue	• The e-government portal for businesses is a single entry point to information and online services for businesses and entrepreneurs provided online by the Central Government, the regions, the provinces and the municipalities[40]. • The e-government portal for employment, 'Cliclavoro', ensures that all stakeholders have a simple and immediate access to a comprehensive catalogue providing detailed employment information and services, available in a shared and collaborative information system[41].
	Business capability	• No artefact found
	Guideline	• The National Guidelines for the valorisation of public information patrimony supports the government in the process of exploitation of public information, defining the main measures to be taken for the implementation of the National Agenda for the valorisation of public information patrimony • The Guidelines for Semantic Interoperability Through Linked Open Data offers a methodological approach to semantic interoperability though the Linked Open Data Model that comes with the reuse of shared common ontologies.

[36] The 2016-2019 Action Plan is Italy's third OG Action Plan and is the result of a joint effort of more than 20 public administrations and the 1st National Forum on Open Government.

[37] http://www.agid.gov.it/agenda-digitale/open-data/dati-pubblici-condivisione

[38] Italy NIFO Factsheet – 2016 update, p.1

[39] The National Operational Programme on Governance and Institutional Capacity combines funding from the European Social Fund (ESF) and the European Regional Development Fund (ERDF). It covers a total budget of EUR 828 million

[40] Only municipalities exceeding 25 000 inhabitants

[41] Italy eGovernment Factsheet 2017, p. 30

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
Operational enabler	Business process specification	• No artefacts found
	Business information exchange/interaction pattern	• Dati.gov.it is an e-government portal for open data. It intends to be a benchmark for open data in Italian Public Administration. It contains links and descriptions for about 150 public databases, made available by the Public Administrations. • Magellano is a core resource for public administrations providing citizens and businesses with multi-channel information on government services[42]. • Being a member of RIPA, international IP connectivity and interoperability services at international level are available – through a connection with the Italian SPC – to enable foreign offices to participate in cooperative applications

The Agency for Digital Italy's website provides an overview of the organisational, semantic and technical interoperability enablers and artefacts for which it is responsible. Given the central role of the Agency for the interoperability of the Italian Public Administrations, its website provides a repository of generic artefacts to support interoperability implementation in digital public service provisioning. However, the analysis could not identify a repository that spans across all layers of governments and government's sectors, centralising the information.

3.6 Lithuania

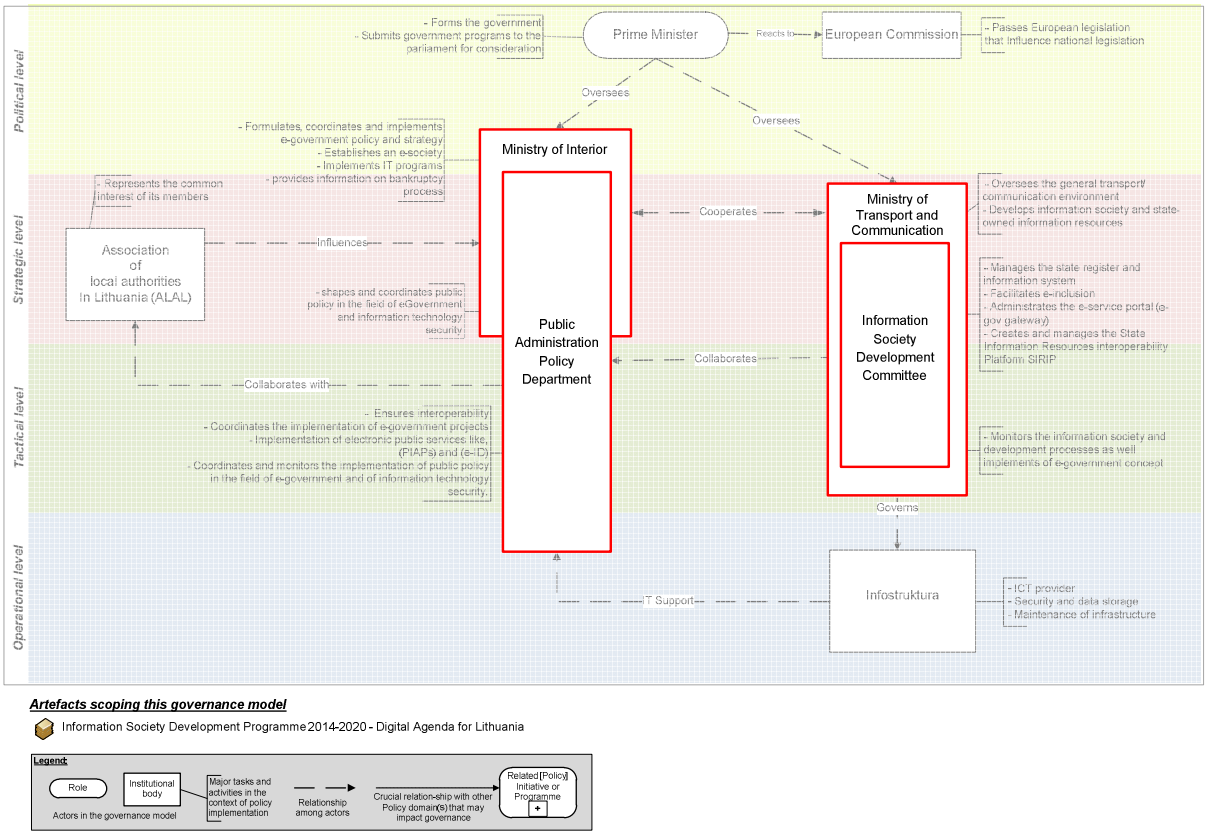
Lithuania's governance structure is centralised around two Ministries, which share the responsibility of fostering interoperability: the Ministry of Interior and the Ministry of Transport and Communication. With the help of their respective internal departments, both ministries' responsibilities span across the different layers (strategical, tactical and operational).

In addition, our research showed Lithuania is using a particular method for the promotion of interoperability across its public administrations. Unlike other countries, Lithuania seems to rely on programmes rather than strategies to foster interoperability. Table 14 shows a complete list of Lithuania's organisational interoperability enablers and artefacts.

Figure 7, below, depicts key actors with particular responsibility to cater for the organisational interoperability artefacts and enablers in Lithuania.

[42] Italy eGovernment Factsheet 2017, p. 32

Figure 7 Governance Structure of Lithuania



Artefacts scoping this governance model

Information Society Development Programme 2014-2020 - Digital Agenda for Lithuania

To implement interoperability enablers and artefacts, Lithuania's key actors execute a set of governance functions as Table 13, below, shows.

Table 13 Governance Functions in Lithuania

Level of Governance	Governance functions	Responsible actor
Strategic	• Develop Programmes related to Information Society • Responsible for coordinating and monitoring the implementation of public policy in the field of e-government such as the Information Society Development Programme 2014 – 2020 Digital Agenda for Lithuania.	Ministry of Transport & Communication
	• Prepare draft laws and other legal acts related to the Information Society; • Coordinates the participation of Lithuania in the ISA^2 Programme; • Responsible for coordinating and monitoring the implementation of public policy in the field of e-government such as the Lithuanian Public Governance Development Programme.	Ministry of Interior
Tactical/ operational	• Provide and maintain a repository for sharing and reusing generic interoperability artefacts: the e-government interoperability Portal (*Sąveikumo portalas);* • Responsible for the implementation of strategic ICT projects, such as the establishment of the Public Internet Access Points (PIAPs) and the eID infrastructure.	Ministry of Interior
	• Provide and maintain a catalogue of services (e-government portal SIRIP); • Responsible for the management and development of central digital government enablers (including supervision of eSignature), ensuring the management of cross-sectorial ICT services.	Ministry of Transport & Communication

Table 14 provides an overview of existing generic organisational interoperability enablers in Lithuania, which desk research identified.

Table 14 Organisational interoperability and artefacts in Lithuania

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
Strategic enablers	Strategy	There is no dedicated interoperability strategy in Lithuania. However, the following Digital Agenda and Regulation stress the importance of interoperability for the digitisation of the public sector: • The Information Society Development Programme 2014 – 2020 Digital Agenda for Lithuania aims to improve the quality of life for the Lithuanian residents as well as the business environment for companies using the opportunities created by the ICTs. The programme is aligned with the Digital Agenda for Europe 2020.[43] • The State Information Resources Management Law
Tactical enablers	Framework / Reference architecture	• Lithuania has no formal document encompassing a National Interoperability Framework (NIF). However, the relevant actors (Ministry of Interior and the Ministry of Transport and Communication) seem to rely on programmes, rather than a framework to achieve the strategic objectives;
	Programme	Various programmes address the interoperability of public administrations: • The Lithuanian Public Governance Development Programme 2012-2020 (PGDP) aims to increase openness of public administration processes and participation of the general public, to provide high-quality administrative and public services and to enhance the performance management of public administrations[44] • The Multi-Fund Operational Programme 2014-2020[45] indirectly addresses the issue of interoperability with its thematic objectives 2 and 11: enhance access to, and use and quality of ICT (n°2) and enhance the institutional capacity of public authorities and stakeholders and efficient public administration (n°11)[46].
	Agreement	• No artefact found
	Service catalogue	• The e-government Portal (SIRIP) is the single entry portal to information and all e-services provided by the Lithuanian public administrations[47].
	Business capability	• Government interoperability Portal (*Sąveikumo portalas)*
	Guideline	• No artefact found
Operational enabler	Business process specification	• No artefact found

[43] Lithuania eGovernment Factsheet 2017, p.11

[44] Lithuania NIFO Factsheet 2016, p.1

[45] The Multi-fund Operational Programme (OP) brings together several key EU investment funds aimed to help Lithuania's economic development as well as tackle social exclusion, unemployment and vital issues like energy security. It reflects the goals of the Europe 2020 strategy with a clear emphasis on boosting research and innovation, SME competitiveness, the shift to a low-carbon economy, the promotion of human capital, especially of young people, and the fight against poverty

[46] Lithuania eGovernment Factsheet 2017, p.13

[47] The portal either provides directly the different e-services or redirects automatically to the service provider's web portal.

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
	Business information exchange/interaction pattern	• No artefact found

The web portal "*Sąveikumo portalas*" (e-government interoperability Portal) is a central repository exclusively dedicated to interoperability. The goal of the portal is to help foster interoperability as a common national value and to store information and resources related to interoperability (standards, specifications, legislation, methodologies, etc.). It is also a forum to exchange best practices both in Lithuania and within the European Union. Furthermore, the website provides an overview of interoperability landscape in Lithuania, lists the current projects and provides links to initiatives in other countries and the European Commission (e.g. ISA/ISA² programme). The e-government Interoperability Portal is an initiative of the Ministry of Interior[48].

3.7 Netherlands

As already introduced in deliverable D03.01 of this project (SC439), the Netherlands has established basic conditions fostering interoperability and collaboration among relevant government actors to provide interoperable digital public services in accordance with the recently adopted Decree of May 17 2016. This decree contains rules on the processing of personal data in the provisions for the Generic Digital Infrastructure DigiD (Digital Identity), DigiD Authorise[49], *MijnOverheid* (MyGovernment portal) and *Burgerservicenummer* (BSN) Link Register regulating how citizens and business should only digitally communicate with the government. This marks the agreement for the establishment of Generic Digital Infrastructure (including portals, authentications, base registers and standards/provisions for data exchange). All public administrations should use it for better and more efficient services. The Generic Digital Infrastructure further aims to realise the government's ambitions to allow easy and secure digital interaction between citizens, business and government.

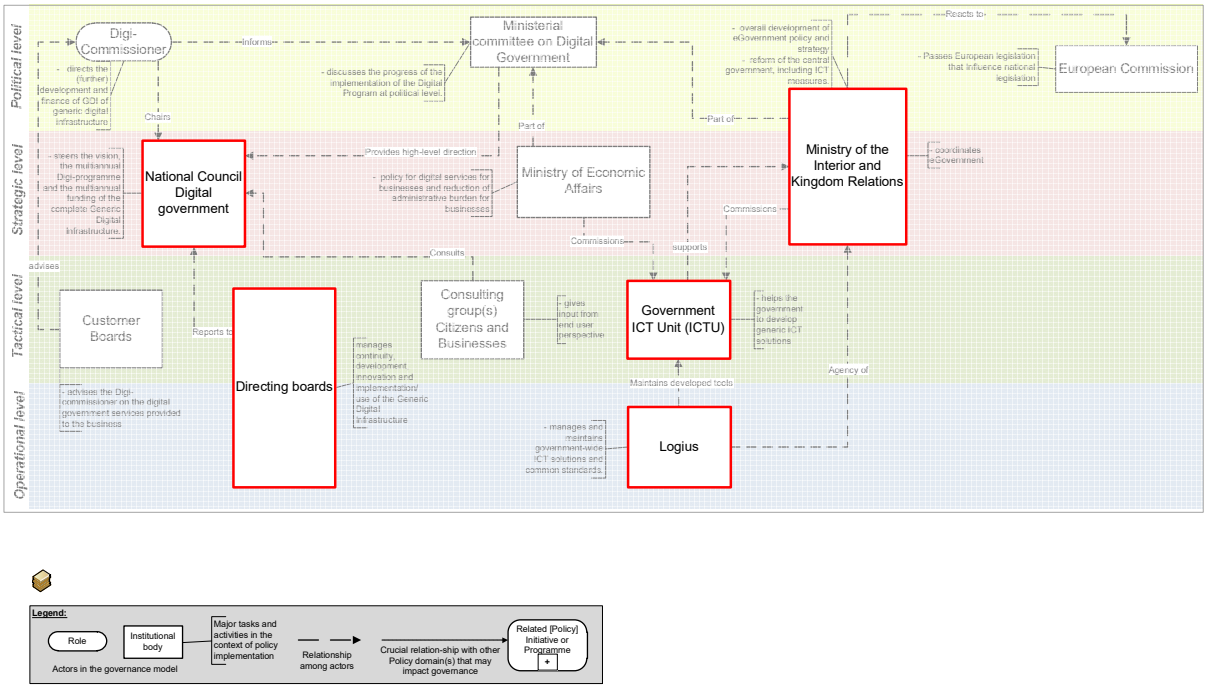
A particular strategic institutional actor is the National Council for Digital Government, which steers the vision, the multiannual Digi-programme[50] and the multiannual funding of the complete Generic Digital Infrastructure. On tactical and operational level, the responsible bodies are the Government ICT Unit (ICTU) and the Government Shared Services for ICT (Logius). Figure 8, below, highlights the main institutional bodies in the Netherlands responsible for creating and maintaining organisational interoperability enablers and artefacts.

[48] The use and utility of the e-government Interoperability Portal could is questionable as it has not been updated since 2014.

[49] DigiD Machtigen, in Dutch, which enables tighter privacy in the use of citizens' Digital Identity (DigiD).

[50] The Digi-programme is a national multi-year, inter-governmental program for Digital Government (Digi-programme); annual executing plans are based upon this Digi-programme. The Digi-programme is a joint product of the National Council and Digi-commissioner. The establishment of this joint multi-annual Digi-programme is an important mean to achieve a shared vision for achieving the common goal and approach. It is crucial that all parties are involved, from policy to implementation, as well as citizens and businesses. The programme for 2016/2017 can be found under: https://www.digicommissaris.nl/page/893/digiprogramma-2016-2017

Figure 8 Governance Structure of the Netherlands



Below, Table 15 shows particular governance functions that relevant institutions execute in the Netherlands, either to ensure interoperability or to provide interoperability artefacts.

Table 15 Governance Functions in the Netherlands

Level of Governance	Governance functions	Responsible actor
Strategic governance	• Coordinate e-government policies and initiatives; • Overall development of e-government policy and strategy;	Ministry of the Interior and Kingdom Relations (BZK)
	• Responsible for the Generic Digital Infrastructure as a whole by steering the vision, the multiannual Digi-programme and the multiannual funding; • Discuss the development of e-government at administrative and strategic levels, including interoperability; • Prepare the Digi-programme, therewith ensuring interoperability as a core principle; • Ensure alignment between interoperability business goals and interoperability solutions;	National Council for Digital Government
	• Discuss and agree on the common agenda, objectives, themes and associated prioritisation regarding standards and the Nederlandse Overheid Referentie Architectuur (NORA - Dutch Government Reference Architecture).	Directing Board Interconnectivity[51]

[51] https://digitaleoverheid.pleio.nl/groups/profile/30208002/regieraad-interconnectiviteit

Level of Governance	Governance functions	Responsible actor
Tactical and operational governance	• Contribute to the provision and exchange of messages/information between the government citizens and businesses; • Support the implementation of digital public services, including the Samenwerkende Catalogi ("cooperating catalogues").52	Directing Board Service Provisioning[53]
	• Responsible for the national interoperability framework (NIF)	Ministry of the Interior and Kingdom Relations (BZK)
	• Create awareness and strengthen widespread interoperability promotion; • Manage NORA; • Develop tools and ICT solutions, which are subsequently maintained by Logius (digital government service of BZK).	Government ICT Unit (ICTU)
	• Trigger supportive measures as needed to ensure and improve interoperability solutions; • Execute the operational management of government services; • Perform daily control and manage standard catalogues as well as support when migrating to a newer standard version.	Logius

Table 16, below, provides an overview of existing generic organisational interoperability enablers in the Netherlands, which the desk research identified.

Table 16 Organisational interoperability enablers and artefacts in the Netherlands

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
Strategic enablers	Strategy	There is no dedicated interoperability strategy in the Netherlands. However, the following strategy stresses the importance of interoperability for the digitisation of the public sector: • The Digital 2017 Implementation Agenda aimed to provide a fully accessible and searchable corpus of digital government information. It provided guidance and objectives per administration level including provinces, municipalities, water boards, and policy departments.".
Tactical enablers	Framework	• The Dutch Government Reference Architecture NORA (*Nederlandse Overheid Referentie Architectuur*) is the Dutch National Interoperability Framework. It is rather generic in the provided interoperability layers and information. To account for more specific application layers for specific context, it has designed the following reference architectures and enterprise architectures[54]: ○ AORTA (Rural Infrastructure messaging in healthcare); ○ Architecture Immigration Process; ○ CORA (Corporation Reference Architecture); ○ Logius Architecture; ○ EAR (Enterprise Architecture civil services); ○ GEMMA (Municipal Model Architecture); ○ HORA (Higher Education Reference Architecture); ○ KarWel (Chain Architecture Work and Income); ○ LIDA (Long-term-care Information Domain Architecture); ○ MARIJ (Model Architecture Central Government);

[52] The *Samenwerkende Catalogi*, which means 'cooperating catalogues', is a platform offered by the Dutch Ministry of Interior Affairs through its ICT and e-government arm, Logius, to all Dutch organisations offering public services.

[53] https://digitaleoverheid.pleio.nl/groups/profile/30207902/regieraad-dienstverlening

[54] http://www.noraonline.nl/wiki/Tabel_met_alle_dochters

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
		○ MARTHE (Model Architecture State surveillance- and Enforcement Units); ○ PETRA (Provincial Enterprise Reference Architecture); ○ PURA (Public Health Reference Architecture); ○ ROSA (Reference Education Sector Architecture); ○ Reference Architecture Youth; ○ Reference Architecture educational content; ○ Standards of information criminal justice system; ○ TARA (Accessible Archives Reference Architecture); ○ Triple A; ○ VERA (Housing Reference Architecture); ○ VeRa (Safety Regions Reference Architecture); ○ WILMA (Water boards & Logical Information Model Architecture)
	Programme	• The Digi-programme 2016–2017 outlines the programme for the Generic Digital Infrastructure[55] for 2016-2017. It highlights the different action plans and provides information on the progress to date.
Tactical enablers	Agreement	• MARIJ offers a set of multilateral agreements including organisational principles for the civil service at central government level; • GEMMA, offers a set of multilateral agreements including organisational principles for the civil service at municipal level[56]; • PETRA offers a set of multilateral agreements including organisational principles for the civil service at provincial level; • WILMA offers a set of multilateral agreements including organisational principles for the civil service at water boards' level; • Digi Network (*Diginetwerk*) is a system for linking private government networks. It allows government organisations to exchange data in a secure manner via these interconnected networks based on interoperability agreements[57].
	Service catalogue	• The Products and Services Catalogue of generic ICT Services 2015, which describes the offered generic ICT services, sorted by responsible organisation/government. • The Cooperating catalogues (*Samenwerkende Catalogi*) provides a virtual catalogue for the entire government. It links the product and service catalogues from various government organisations, making it easier to find by end users.
	Business capability	• The Cooperating catalogues (*Samenwerkende Catalogi*) provides a set of agreements on publishing exchange of meta data on products and services of government organisations
	Guideline	• The Governance, management and development of NORA
Operational enabler	Business process specification	While no particular generic or specific business process models were identified, the Netherlands has set up the following: • The Architecture for Information Systems' operational Process, focused on the control of the execution of the business processes
	Business information exchange/interaction pattern	• No artefacts found

[55] The Generic Digital Infrastructure (GDI) provides government bodies with the basic facilities to help them organise and deliver their public services. It consists of standards, products and services, used jointly by (all) several governments, many public administrations and in some cases private parties. It was established through the Dutch Act on the Generic Digital Infrastructure (GDI Act). More can be read on https://www.digicommissaris.nl/image/2016/7/14/factsheet_en_web06.pdf and https://www.digitaleoverheid.nl/digitaal-2017/digitalisering-aanbod/gdi.

[56] http://www.noraonline.nl/wiki/GEMMA_(Gemeentelijke_ModelArchitectuur)

[57] https://www.logius.nl/ondersteuning/diginetwerk/

The Netherlands does not have dedicated repositories of organisational enablers and artefacts, as it instead uses a standard (Cooperating catalogues), connecting the service catalogues of all government websites. The services are accessible via search options, such as the one available on the central access point to all information about government organisations of the Netherlands[58].

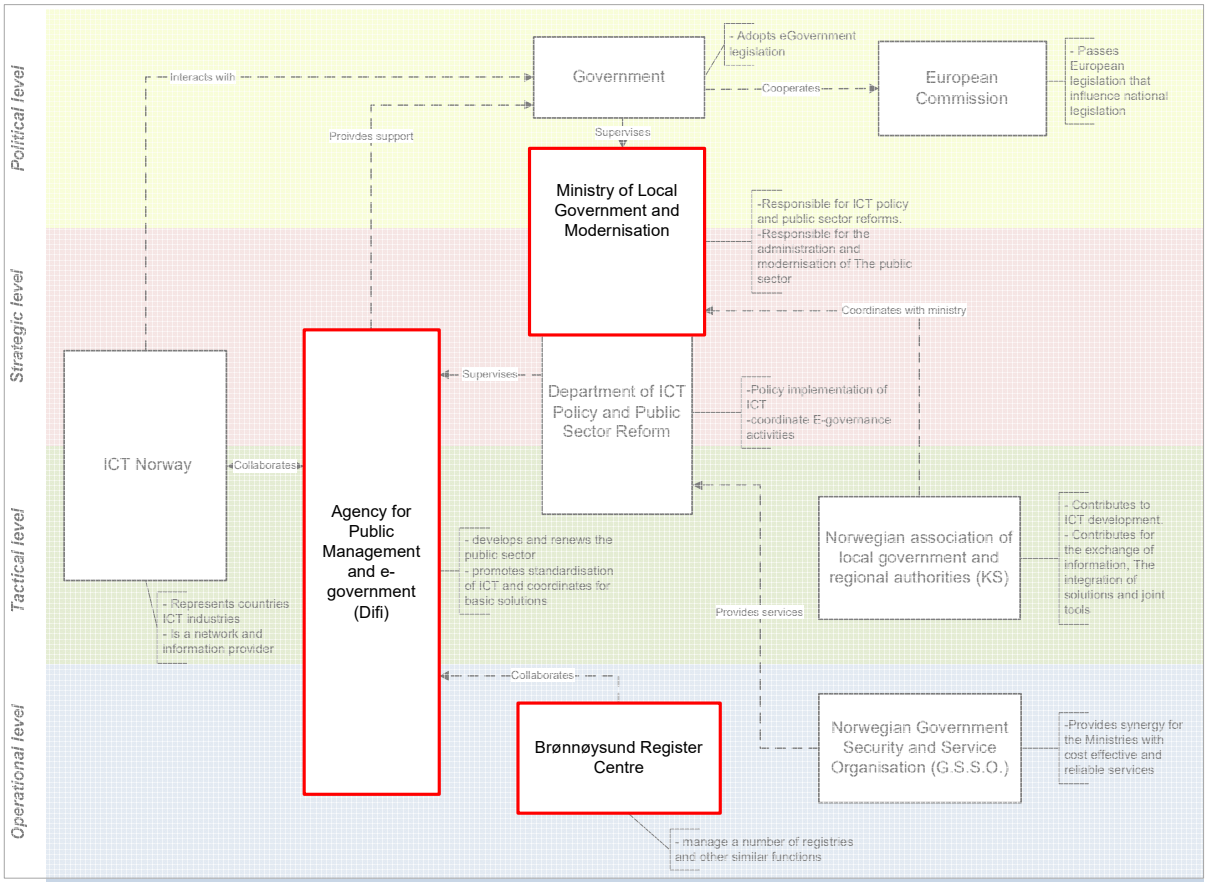
[58] https://overheidsloket.overheid.nl/page

3.8 Norway

Throughout the years, the Norwegian Government has taken an active role in breaking up legal and regulatory barriers in the provision of online services[59] introducing the 'Digital by default' principle in 2014[60].

As seen on Figure 9, acting mainly on the strategic level, the Ministry of Local Government & Modernisation is the driving force behind the digitisation of the public sector. The Ministry ensures interoperability of different public agencies through legal means such as strategies (Digital Agenda for Norway, Cloud Computing strategy for Norway) and guidelines (Digitisation Circular 2017, Guidelines for Public Data Availability).

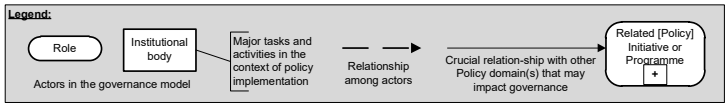
Figure 9 Governance Structure of Norway



Artefacts scoping this governance model

Digital Agenda for Norway (2017-2020)

Digitising Public Sector Services- Norwegian e-government Programme



[59] Relevant legislation includes: The Public Administration Act, the Regulation on Electronic Communication with and within the Public Administration, the Regulation on IT Standards in public sector. A list of all applicable regulations is available on the universal design website from DIFI.

[60] Norway NIFO Factsheet 2016, p.6

In addition, through its Department of ICT Policy and Public Sector Reform, it oversees the work of the Agency for Public Management and E-Government (Difi), which is the key actor on the tactical and operational level. Difi supports and assists public administrations in their digital transformation by providing digital tools such as portals and websites, and by conducting quality assessments of e-government websites and digital services, ensuring alignment between interoperability business goals and interoperability solutions.

To implement interoperability enablers and artefacts, Norway's key actors execute a set of governance functions, as Table 17, below, summarises.

Table 17 Governance Functions in Norway

Level of Governance	Governance functions	Responsible actor
Strategic	• Responsible for the ICT Policy and Public Sector reform and more specifically for the modernisation of the public sector; • Formulate strategies for the use of ICT in society, such as the Digital Agenda for Norway and the Cloud Computing strategy for Norway; • Oversee the Agency for Public Management and e-government (DIFI).	Ministry of Local Government and Modernisation
	• Monitor and evaluate the implementation of ICT related policies.	Difi
Tactical/ operational	• Trigger supportive measures as needed to ensure effective use of interoperability artefacts and to improve interoperability solutions; • Provide guidelines and recommendations to help implement the digitisation of the public sector.	Ministry of Local Government and Modernisation
	• Conduct quality assessments of e-government websites and digital services; • Create awareness and strengthen widespread interoperability promotion; • Provide guidance through the national interoperability framework (NIF); • Advise and assist public bodies in their digitisation; • Implement projects and activities in ICT development in the public sector; • Provide and maintain a standard portal, providing guidance on the mandatory nature of the available standards for public administrations; • Provide and maintain a repository for sharing and reusing generic artefacts, centralising e-services and e-government information.	Difi
	• Offer solutions for e-government and e-administration; • Develop and operate digital services that streamline, coordinate and simplify dialogue with public bodies for private individuals and organisations; • Operate many of the country's most important registers[61], as well as metadata registries.	Brønnøysund Register Centre

[61] Among others: The Registry of Mortgaged Movable Property, the Registry of Company Accounts, the Registry of Business Enterprises the European Business Registry, the Registry of the Reporting Obligations of Enterprises, the Registry of Bankruptcies, the Central Coordinating register of Legal Entities, Altinn, etc.

Table 18, below, provides an overview of existing generic organisational interoperability enablers in Norway, which desk research identified.

Table 18 Organisational interoperability enablers and artefacts in Norway

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
Strategic enablers	Strategy	There is no dedicated interoperability strategy in Norway. However, the following strategic documents stress the importance of interoperability for the digitisation of the public sector • Digital Agenda for Norway: the new ICT Strategy has two key objectives: (i) to ensure a user-centric and efficient public administration and (ii) to achieve value creation and inclusion through the use of digital services. Furthermore, it has the following five key priorities: (i) user centric focus, (ii) ICT should constitute a significant input factor for innovation and productivity, (iii) strengthened digital competence and inclusion, (iv) effective digitisation of the public sector and (v) sound data protection and information security. • The Cloud Computing strategy for Norway promotes the use of cloud computing in the public service provisioning and public sector digitisation wherever cloud services promise the best results and most cost-effective solutions
Tactical enablers	Framework / Reference architecture	The Norwegian Interoperability Framework is not a framework as such but the following components are considered to constitute the Norwegian NIF: • Common architectural principles; • Mandatory and recommended standards; • Common ICT components; • Information security
	Programme	• The Digitising Public Sector Services – Norwegian E-Government Programme 2012 refers to different ICT standards, such as for information security, for a common digitisation platform, e-invoicing and others. It further mentions interoperability as an architectural principle for the State's ICT solutions.
Tactical enablers	Agreement	• No artefacts found
	Service catalogue	• Norge.no is Norway's gateway and guide to digital services from the Norwegian public authorities. The portal also has information about digital communication between public authorities and citizens. In particular, Norge.no presents citizens with information about the Norwegian public sector's digital mailbox[62]. • Altinn serves as a service catalogue (with a restricted set of services) and single point of contact for information and data exchange for businesses.[63]
	Business capability	• The Standard Portal provides all information regarding standards in the Norwegian public Sector. The portal also provides a catalogue publishing all mandatory and recommended standards that are approved by the Standards Council;

[62] Norway eGovernment Factsheet 2017, p.22

[63] Altinn also serves as a technical platform that public agencies can use to create digital services. The platform is the result of collaboration between different national and local public administrations in Norway. The Brønnøysund register Centre, which is a government agency subject to the Ministry of Trade and Industry, manages it. It administers several registers for public administrations, offering solutions in e-government and e-administration.

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
	Guideline	• The Digitisation Circular 2017 is an annual compilation of national orders and recommendations for the digitisation of the public sector, giving a comprehensive picture of which guidelines apply; • The Guidelines for Public Data Availability: aims to both describe how the data can be used (legal) and how the data is technically made available (format and if any API); • ELMER is a set of guidelines to help ensure that public administration forms for the private sector are designed in a uniform and user-friendly manner. Public administrations are required to follow the ELMER standard for forms online[64].
Operational enabler	Business process specification	• The Semantic Registry for Electronic Collaboration (SERES) is a standard used within Altinn, which contains metadata to be used in information management and the provision of services[65]
	Business information exchange/interaction pattern	• Altinn is a digital portal for dialogue between business, private and government agencies. Businesses file their reporting information to Altinn either through the Internet portal or by using their own internal information systems, or software packages. Individuals can also file their personal income tax electronically through Altinn. Altinn is also Norway's single point of contact for all information needed by any European service provider interested in starting a business in Norway[66].

Finally, Difi established a "Contact and Reservation Registry", the use of which is mandatory for all public agencies wishing to communicate digitally with the citizens. The register contains the citizens electronic contact information as well as information on whether citizens agree to use the digital communication means[67].

3.9 Poland

In Poland, the Ministry of Digital Affairs is the sole actor fully dedicated to the digitisation of the State and the Information Society, acting on all layers (strategic, tactical, and operational). Established in 2015, the Ministry pursues the work of the former Ministry of Administration and Digitisation and created a digital boost for the development of Poland. It launched and implements several Programmes such as the Operational Programme Digital Poland 2014-2020, the Programme for Opening Public Data (2016), the Programme of Integrated Information Technology for the State 2020 (PZIP), or the Paperless and Cashless Poland programme. The development and extension of various online platforms centralising information and providing e-services to businesses, citizens and administrations is another sign of this new digital effort.[68] It is noticeable that unlike other Member States, the country does not have a digitisation nor interoperability strategy as such and steers its digitisation through programmes. In this sense, Poland seems to follow the same approach as Lithuania.

[64] https://brukskvalitet.brreg.no/

[65] https://www.brreg.no/om-oss/oppgavene-vare/alle-registrene-vare/om-seres/

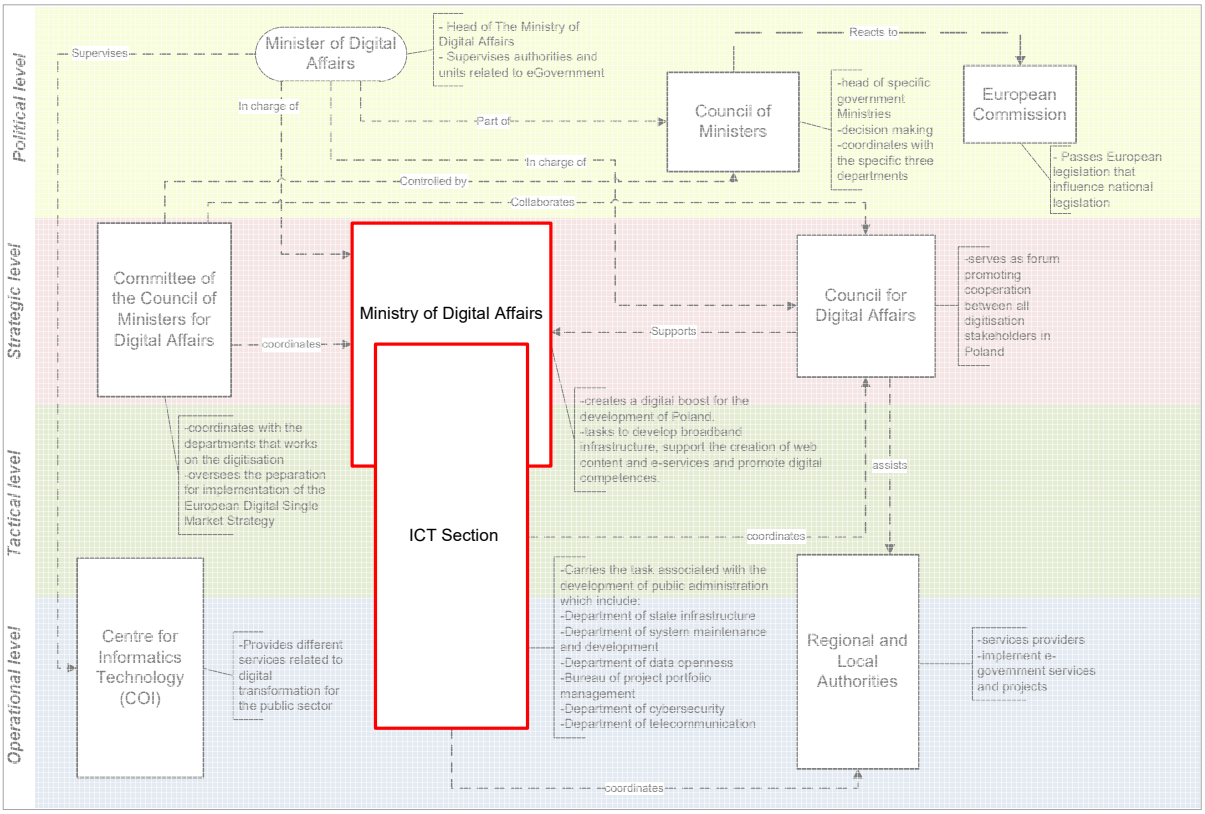
[66] Norway eGovernment Factsheet 2017, p.22

[67] Norway NIFO Factsheet 2016, p.6

[68] Poland eGovernment Factsheet 2017

Figure 10, below, highlights the political bodies responsible for the artefacts and enablers mentioned above.

Figure 10 Governance Structure of Poland



Artefacts scoping this governance model

Digital poland 2020

Programme of Integrated Information Technology for the State 2020 (PZIP)

Programme of Integrated Information Technology for the State 2020 (PZIP)- Action Plan of the Ministers of Digital Affairs

Table 19, below, shows particular governance functions that relevant institutions execute in Poland to ensure interoperability or to provide interoperability artefacts.

Table 19 Governance Functions in Poland

Level of Governance	Governance functions	Responsible actor
Strategic	Through its different departments, the Ministry of Digital Affairs: • Drafts legislative proposals that help to strengthen the information society; • Cooperates with the EU and international organisations in the field of telecommunication; • Advises public and non-public institutions sharing citizen oriented information and services in electronic form;	Ministry of Digital Affairs

Level of Governance	Governance functions	Responsible actor
Tactical/ operational	Through its different departments, the Ministry of Digital Affairs has the responsibility to: • Develop broadband infrastructure; • Support the creation of web content and e-services; • Promote digital competences among citizens; • Prepare analysis on cybersecurity and its risks to the security of state, as well as develop the central training plans, exercises and tests; • Develop and maintain registers, records and systems; • Develop the common ICT infrastructure; • Facilitate citizens' access to information on public administration and services provided to citizens in Poland; • Provide and maintain a repository for sharing and reusing generic interoperability artefacts; • Provide and maintain a catalogue of services and a catalogue of standards; • Create and supports digital-oriented campaigns, initiatives and partnerships; strengthening widespread interoperability promotion.	Ministry of Digital Affairs

Table 20, below, provides the list of all organisational interoperability enablers and artefacts in Poland.

Table 20 Organisational interoperability enablers and artefacts in Poland

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
Strategic enablers	Strategy	There is no dedicated interoperability strategy in Poland. However, the following strategies stress the importance of interoperability for the digitisation of the public sector: • The Strategy for responsible development 2020: Although the strategy aims to reduce poverty and social exclusion, it also includes e-government measures, involving the effective use of ICTs in public administration[69]; • The Programme of Integrated Information Technology for the State 2020 – Action Plan of the Minister of Digital Affairs (SIP)[70] assembles guiding principles as a reference for any e-government action.
Tactical enablers	Framework / Reference architecture	• The State Information Architecture (AIP) is a set of principles, requirements, standards and models aimed to build a digital society; • The Poland National Interoperability Framework (NIF) is a legislative document, which enforces interoperability for the public administrations[71].

[69] Poland eGovernment Factsheet 2017, p. 13

[70] The Action Plan is in fact an annex to the Programme of Integrated Information Technology for the State 2020.

[71] Poland NIFO Factsheet 2016, p.1

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
	Programme	• The Operational Programme Digital Poland 2014-2020 aims to strengthen the foundations for the development of a digital country, including broad access to high-speed Internet, efficient and user-friendly public e-services and the ever-increasing level of digital literacy in society; • The Programme of Integrated Information Technology for the State 2020 (PZIP) aims to create a coherent, logical and efficient information system for the State, providing e-services at national and European level in a cost-effective manner. Reducing the duplication of functionality between new and existing IT systems is also part of the programme; • The Paperless and Cashless Poland programme aims to digitise services, processes and transactions. The programme is a joint effort of several ministries[72]; • The Programme for Opening Public Data (2016): The main aim of the programme is to improve the quality and quantity of available data via single website (danepubliczne.gov.pl). It will also increase transparency of public administration and facilitation of citizens' participation in governance, analysis and public data re-use.
Tactical enablers	Agreement	• The Government and Local Government Co-operation 2016-2021 Project aims to enable the exchange of experiences and good practice and to develop recommendations for the construction of an open state and modern e-government across the different levels of government[73]. The project falls under the supervision of the Ministry of Digital Affairs.
	Service catalogue	At present, Poland does not have an online Services Catalogue[74]. However, the gov.pl portal gives access to an excel file listing all e-services available and the link to it. Several platforms provide some e-services or information about e-services and therewith act as a kind of service catalogue: • The citizens portal (Obywatel.gov.pl) is a central repository of information for citizens, covering administrative procedures on various topics such as marriage, education, real estate or taxes. It provides information about 37 e-services, redirecting the users to the ePUAP portal to use the e-services; • The Business portal (Biznes.gov.pl) is the equivalent of the citizens portal but for businesses, providing information and redirecting for 310 online services; • Praca.gov.pl provides any e-services related to the labour market
	Business capability	• The EZD platform provides public administrations with tools for their daily work, including a tool for electronic documents management.
	Guideline	• No artefact found
Operational enabler	Business process specification	• No artefact found
	Business information exchange/interaction pattern	• No artefact found

[72] The following ministries jointly run the programme: Development, Digital Affairs, Finance, Family, Labour and Social Policy, Health, and Infrastructure and Construction.

[73] the Joint Commission of Government and Territorial Self-Government, the Association of Polish Provinces, the Union of Polish Districts, the Union of Polish Metropolis, the Union of Rural Communes of the Republic of Poland, the Union of Polish Cities, the Center for Health Information Systems, the Ministries and central offices., the e-government Coordination Unit and the Program Board LW2016

[74] The Ministry of Digital Affairs aims to create (in place of the excel file) a functional Digital catalogue, which will be part of the Gov.pl portal

The Electronic Platform of Public Administration Services (ePUAP portal) is a system allowing public institutions to provide administrative services to the public through electronic communication channels. It intends to ensure smooth and secure communication between citizen to administration (C2A), business to administration (B2A) and administration-to-administration (A2A) interaction. The portal provides the following functionalities[75]:

- Public services catalogue – a platform presenting and describing administration services;
- ePUAP platform – a web platform designed to provide public services on the Internet;
- Interoperability portal – a portal for experts working on recommendations for electronic documents and forms used within Polish administration systems to assure the uniformity of IT standards; and
- Central Repository of Electronic Document Models – a database for valid document models and electronic forms.

The ePUAP project has evolved in stages since 2006 with 75% financing from the European Regional Development Fund[76].

3.10 Portugal

As introduced in deliverable D03.01 of this project (SC439), Portugal's interoperability governance structure is rather unique compared to other countries. Firstly, this includes that all strategic interoperability enablers and artefacts are the result of a Decision from the Council of Minister as a whole. Unlike other countries, there is no unilateral decision from a Minister or Ministry on an ICT Strategy. Second, rather than a Ministry, an Agency holds political responsibility for the interoperability strategy of the country. The Agency for Administrative Modernisation is indeed the key actor behind almost all strategic, tactical and operational interoperability enablers and artefacts such as: the Simplex Programme, the Simplify Programme (*Simplificar*), the Citizen's portal (*portal do cidadão)*, the Dados.gov.pt portal, the Interoperability in Public Administration platform (iAP platform) etc.

Figure 11, below, highlights the key actors in Portugal that foster interoperability enablers and artefacts.

[75] https://epuap.gov.pl/wps/portal/english

[76] https://www.gov.pl/cyfryzacja/platforma-integracji-uslug-i-danych

Figure 11 Governance Structure of Portugal

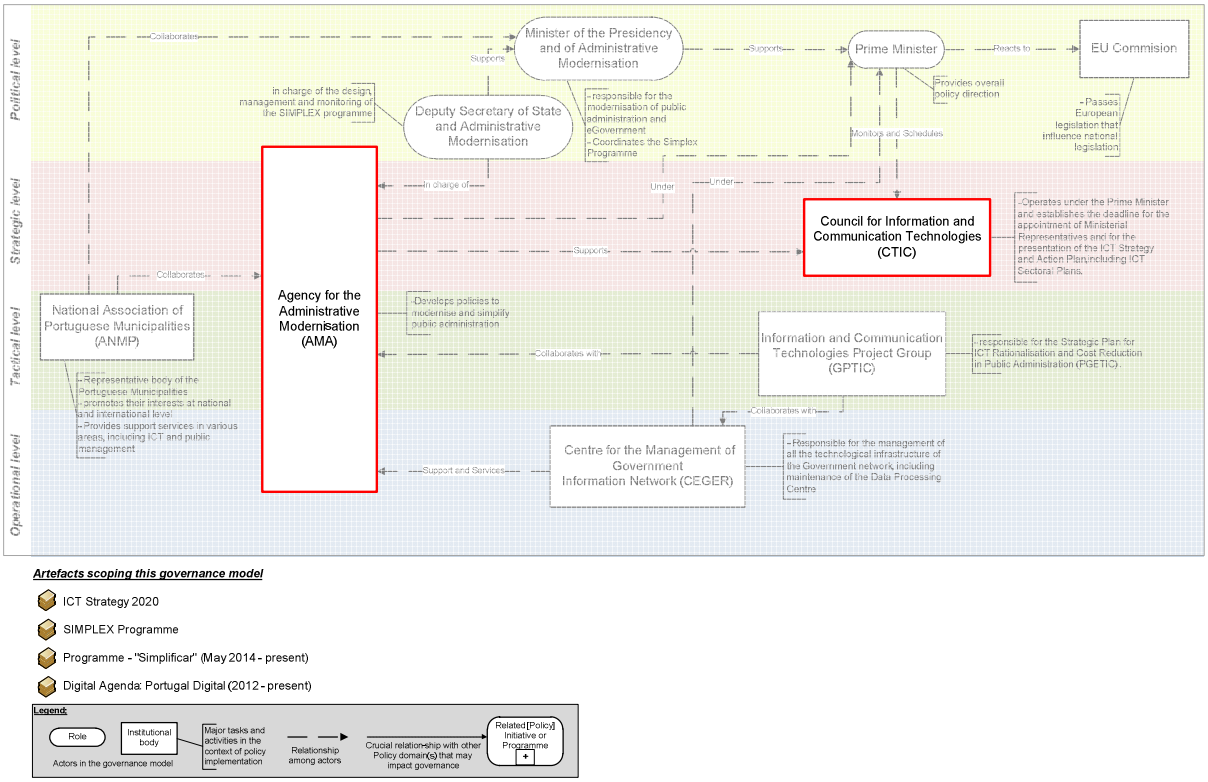


Table 21 provides an overview of particular governance functions relevant to ensure interoperability in Portugal.

Table 21 Governance Functions in Portugal

Level of Governance	Governance functions	Responsible actor
Strategic	• Approve and publish all strategic decisions related to ICT;	Council of Ministers
	• Responsible for operationalising the strategy and the global action plan for Information and Communication Technologies for the Public Administrations (PA); • Promote the study of ICT in the public administrations, including the analysis of information systems and organisational structures; • Monitor the implementation of measures taken by other entities, including the measures contained in sectoral ICT plans, and monitor the integration and alignment of sectoral action plans with the ICT strategy.	Council for Information and Communication Technologies in Public Administrations (CTIC)
	• Define strategic guidelines and policies related to electronic administration and administrative simplification, including the interoperability of the Public Administration; • Ensure the external representation and establish cooperation relationships within its assignments with other foreign entities, namely within the European Union and Lusophone countries; • Boost and coordinate the inter-ministerial network of modernisation and administrative simplification agents. • Ensure alignment between interoperability business goals and interoperability solutions;	Agency for Administrative Modernisation (AMA)

Level of Governance	Governance functions	Responsible actor
Tactical/ operational	• Coordinate measures, programmes and projects aimed to modernise and simplify the Public Administration, the electronic administration and the distribution of public services; • Responsible for transversal interoperability in public administrations; • Provide and maintain a catalogue of services and a catalogue of standards; • Trigger supportive measures as needed to ensure effective use of interoperability artefacts and to improve interoperability solutions; • Provide the National Interoperability Framework (NIF).	Agency for Administrative Modernisation (AMA)

Table 22 provides an overview of existing generic organisational interoperability enablers in Portugal, which the desk research identified.

Table 22 Organisational interoperability enablers and artefacts in Portugal

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
Strategic enablers	Strategy	There is no dedicated interoperability strategy in Portugal. However, the following strategic documents stress the importance of interoperability for the digitisation of the public sector: • The ICT Strategy 2020 makes technology "an instrument of transformation". The Strategy is organised around three axis, one of which focusing on 'integration and interoperability'; • The Digital Agenda: Portugal Digital aims to promote the development and use of digital economy by citizens, businesses and the State, stimulating the production of products, services and competitive technological solutions, targeting international markets[77]; • The Strategic Plan of ICT Rationalisation and Cost Reduction in Public Administration (PGETIC) aims to improve the quality of services provided to citizens and companies with Information and Communication Technologies in the Public Administration[78].
Tactical enablers	Framework / Reference architecture	• The National Interoperability Framework (NIF) focuses mainly on the technical interoperability through the availability of a service-oriented integration layer between all public Information Systems[79].
	Programme	• The Simplex+ Programme is a comprehensive administrative and legislative simplification programme, which addresses the need for simplifying the public sector and its service provision. • The Simplify Programme (*Simplifica*r) defines an ambitious agenda for Portugal in administrative modernisation domains. It aims to create new services delivery models, simplification principles and strengthen interoperability measures[80].
Tactical enablers	Agreement	• No artefact found

[77] Portugal eGovernment Factsheet 2017, p.18

[78] The PGETC proposes 25 measures, structured in five strategic axes: improve governance mechanisms (1), reduce costs (2), enhance administrative change and modernisation (3), adopt common solutions (4) and stimulate economic growth (5).

[79] Portugal NIFO Factsheet 2016, p.1

[80] Portugal eGovernment Factsheet 2017, p.18

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
	Service catalogue	• The Citizen's portal (*portal do cidadão)* is the central channel for electronic access to public services. It currently offers more than 1,000 citizen-oriented 24/7 services provided by around 160 bodies and public entities (central and local). E-services range from daily life events (birth, employment etc.) to specific policy areas (justice, health etc.)[81]; • The citizens' portal also includes a business portal, providing electronic access to public services supplied to business by way of an integrated access point.
	Business capability	• No artefact found
	Guideline	• No artefact found
Operational enabler	Business process specification	• No artefact found
	Business information exchange/interaction pattern	• The National Digital Interoperability Regulation (RNID) defines the technical specifications and digital formats to be adopted by the Government and addresses open formats[82]; • The "Canonical Data Model" (CDM) is a "common data model" meant to be a point of reference in data communication between various entities subscribing to the services of iAP. It allows the exchange of information without changing the legacy data model underlying the public administration and the registry systems providing data to other public administration services;[83] • The National Regulation for Digital Interoperability 2012 (RNID) establishes the obligatory use and application of open standards to ensure technical and semantic interoperability in the information systems of public administration.

The RCC Common knowledge Network is a collaborative platform to support the sharing of information about modernisation, innovation and administrative simplification of Public Administration. It is a network of knowledge sharing based on open membership by public bodies, central and local administrations, private entities and any citizen who wishes to participate[84].

3.11 Slovakia

The interoperability governance structure of Slovakia is rather centralised, with the Deputy Prime Minister's Office for Investments and Informatisation of the Slovak Republic[85] (hereafter: Office for Investment and Informatisation) being a key actor in Slovakia's interoperability governance. The Office for Investment and Informatisation is in charge of all central aspects of the Information Society and e-government in public administrations at national and international levels, including the responsibilities related to the Digital Agenda for Europe and the Digital Single Market Strategy, also taking into account their e-government aspects. Within

[81] Portugal eGovernment Factsheet 2017, p.35

[82] Portugal NIFO Factsheet 2016, p.5; unfortunately, no link could be found for the Regulation.

[83] Portugal NIFO Factsheet 2011

[84] Portugal eGovernment Factsheet 2017, p.38

[85] Before 1 June 2016, the competencies in the area of digitisation of society fell under the competencies of the Ministry of Finance.

the Office, both the Information Society Section and the e-government Architecture Office are the departments responsible for the provision of organisational enablers and artefacts.

While the tasks of the Information Society Section span across all levels studied (political, strategical and tactical), the e-government Architecture Office acts more on the operational level.

Figure 12 highlights the bodies responsible for the provision of organisational interoperability enablers and artefacts.

Figure 12 Governance Structure of Slovakia

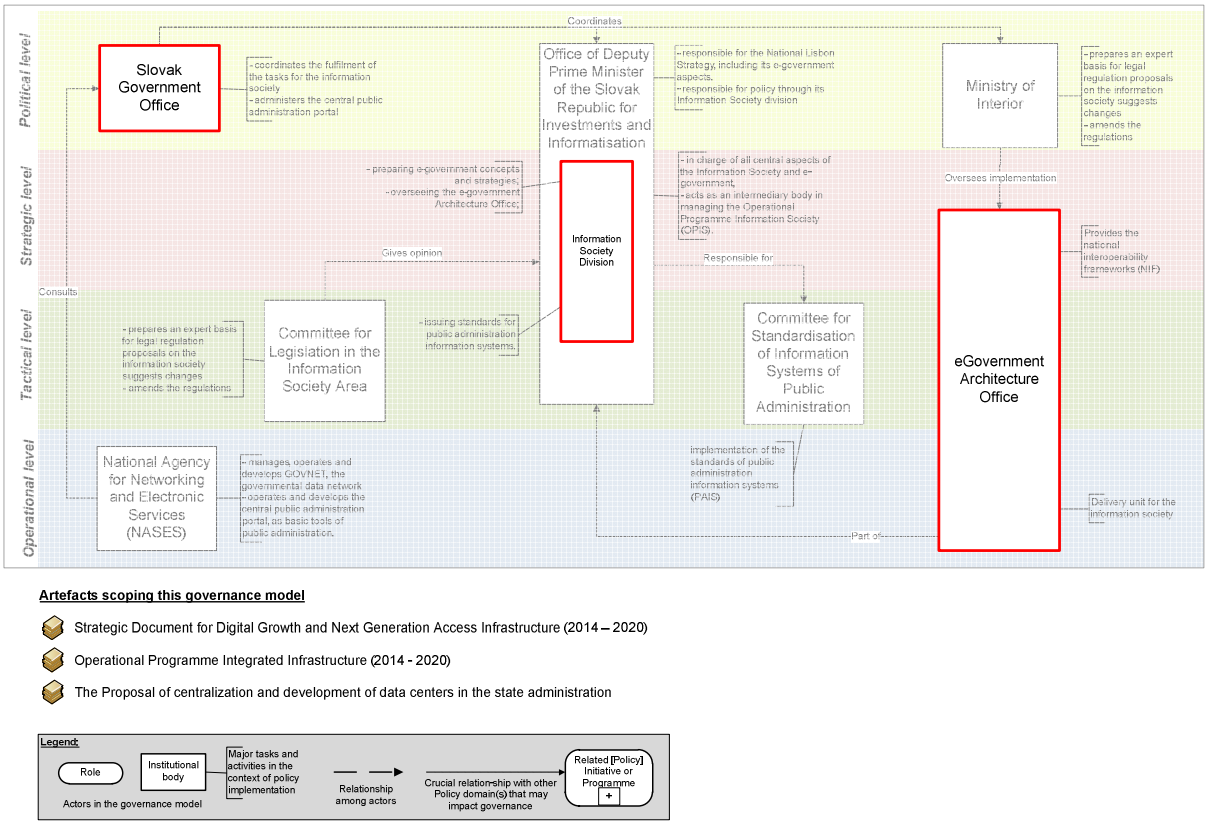


Table 23 shows the particular governance functions that the highlighted institutions execute.

Table 23 Governance Functions in Slovakia

Level of Governance	Governance functions	Responsible actor
Strategic governance	• Ensure alignment between interoperability business goals and interoperability solutions; • Monitor interoperability maturity and the achievement of interoperability goals.	Information Society Section (part of the Deputy Prime Minister's Office for Investments and Informatisation of the Slovak Republic)
	• Coordinate the fulfilment of the tasks for the information society.	Slovak Government Office

Level of Governance	Governance functions	Responsible actor
Tactical and operational governance	• Provide and maintain a repository for sharing and reusing generic interoperability artefacts; • Trigger supportive measures as needed to ensure and improve interoperability solutions; • Create awareness and strengthen widespread interoperability promotion; • Provide and maintain a catalogue of services and a catalogue of standards; • Prepare guidelines for the development of information systems in public administration; • Publish standards for information systems in public administration.	Information Society Section (part of the Deputy Prime Minister's Office for Investments and Informatisation of the Slovak Republic)
	• Provide the national interoperability frameworks (NIF); • Plan and systematically support the development of the e-government architecture according to the defined principles, goals and priorities; • Coordinate the implementation of the e-government information systems with the comprehensive reform of the public administration, overseen by the Ministry of Interior.	e-government Architecture Office (part of the Deputy Prime Minister's Office for Investments and Informatisation of the Slovak Republic)

To illustrate the governance functions, Table 24 provides an overview of existing generic organisational interoperability enablers in Slovakia, which desk research identified.

Table 24 Organisational interoperability enablers and artefacts in Slovakia

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
Strategic enablers	Strategy	While no interoperability strategy exists in Slovakia, the following strategic documents cover the relevant interoperability objectives: • The Strategic Document for Digital Growth and Next Generation Access Infrastructure (2014 – 2020)[86]; • The Proposal of centralisation and development of data centers in the state administration[87]
Tactical enablers **Tactical enablers**	Framework	The formal National Interoperability Framework is currently under preparation. The National Concept of e-government is a conceptual document that defines the strategic Enterprise Architecture of eGovernment[88]. Furthermore, the following generic tools contribute to interoperable public service provisioning:

[86] http://www.informatizacia.sk/ext_dok-strategicky_dokument_2014_2020_en/16622c

[87] http://www.informatizacia.sk/ext_dok-the_proposal_of_centralization_and_development_of_data_centres/18609c

[88] Currently under discussion, the older version of the Concept is available under: http://www.informatizacia.sk/index/open_file.php?ext_dok=6233

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
		• The Standards for Public Administration Information Systems - instruments for implementation and maintenance of interoperability of the information systems and usage of ICT; • The Objectives, principles and approaches for the creation of strategic architecture of public administration[89]; • The Information on the progressive implementation architecture of public administration in Slovakia
	Programme	• The Operational Programme Integrated Infrastructure (2014 - 2020)[90]
	Agreement	• No artefacts found
	Service catalogue	• MetaIS includes service catalogue for multiple e-government services of state and municipal level.
	Business capability	• No artefacts found
	Guideline	• No artefacts found
Operational enabler	Business process specification	• No artefacts found
	Business information exchange/interaction pattern	• No artefacts found

The Central meta information system of public administration (MetaIS) is a central repository in Slovakia. It supports the creation of an inclusive information society as a tool for the development of highly efficient knowledge economy. MetaIS is a registration portal, which contains different e-government components, such as data lifecycle management and data services, licenses, referential registers and reference personal identifiers, information systems and others. Its goal is to ensure the correctness, completeness and availability of current information. Its functions relevant to organisational interoperability include:

- recording and updating the data in each MetaIS module, analysing data and adopting measures for the effective building of an integrated public administration information system; and
- incorporating information on operating the information systems of public administrations, e-services, as well as other technological and administrative data, which is then published by the relevant institution that manages the public administration information system.

[89] The strategic architecture of public administration defines the key building blocks of the information environment and public management. This aligns them with the objectives and principles of the e-government development plan, and ensures high quality of public services and public administration information systems.

[90] http://www.informatizacia.sk/ext_dok-opii-2014---2020/19079c;

3.12 Spain

As introduced in deliverable D03.01 of this project (SC439), Spain has a complex governance structure. This complexity is reflected in the vast number of actors involved in fostering interoperability, which include:

- The Ministry of Energy, Tourism and Digital Agenda;
- the Ministry of Finance and Public Administration;
- the General Secretariat for e-government;
- the ICT Strategy Committee;
- the State Secretariat for the Public Function (SEFP);
- the State Secretariat for Information Society and Digital Agenda (SESIAD);
- the Commission for the Reform of Public Administration (CORA); and
- Red.es.

Every actor is involved on a different level, whether strategic, tactical or operational. In addition to this wide range of involved actors, Spain has a large number of interoperability enablers and artefacts covering almost all categories studied in this report. As a result, Spain is, according to the 'State of Play of Interoperability in Europe - Report 2016', among the countries in the European Union outperforming other countries in terms of interoperability implementation and monitoring[91]. For instance, their Digital Transformation Plan for the General Administration and Public Agencies (2015–2020) mandates the updating of the catalogue of administrative procedures. This Plan also envisioned the update of the National interoperability framework.

Figure 13 and Table 25 below, respectively highlight the governance structure and its key actors' functions with regard to interoperability enablers and artefacts.

[91] '2016 State of play on interoperability implementation and monitoring":

Figure 13 Governance Structure of Spain

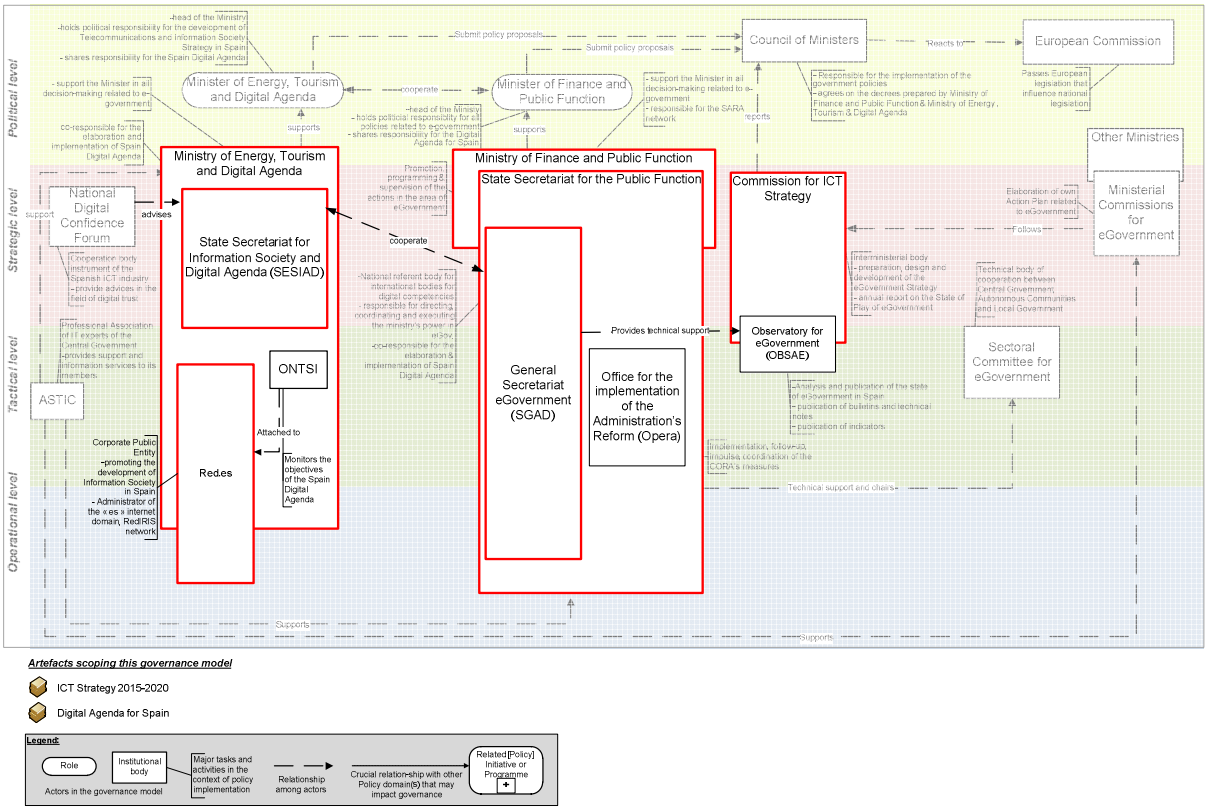


Table 25 Governance Functions in Spain

Level of Governance	Governance functions	Responsible actor
Strategic governance	• Share political responsibility for the Digital Agenda for Spain; • Responsible for all decision-making related to the Telecommunication and Information society; • Responsible for the follow-up of the specific Action Plans and annual actions carrying out the Digital Agenda for Spain; • Monitor the implementation of these plans and evaluate their results and dissemination. It shares this competence with the General Secretariat for e-government.	Ministry of Energy, Tourism and Digital Agenda
	• Hold political responsibility for all e-government policies and supervise the work of this department; • Share political responsibility for the Digital Agenda for Spain; • Responsible for the e-government strategy; • Promote the full incorporation of information technologies and communications for the provision of public services.	Ministry of Finance and Public Administration
	• Direct, coordinate and execute the powers attributed to the Department in the area of e-government and the rationalisation of the information and communication technologies for the State General Administration; • Draft the ICT strategies and strategies related to e-government and the Digital Agenda for Spain; • Act as a national reference body for the European and international bodies and institutions in the area of digital competencies.	General Secretariat for e-government
	• Prepare, design and develop the e-government strategy and ICT policy for Spain's central administration	Commission for ICT Strategy

Level of Governance	Governance functions	Responsible actor
Tactical and operational governance **Tactical and operational governance**	• Promote the cooperation between the public administration in the field of e-government; • Promote the use of common platforms for the integration of the services of the different public administration electronic headquarters; • Provide a service catalogue.	State Secretariat for the Public Function (SEFP)
	• Executed and published a study on the situation of public administrations in Spain (CORA report) which led to the proposition 222 measures to reform the administration, some of them being related to e-government.	Commission for the Reform of Public Administration (CORA)
	• Promote the development of Information Society in Spain; • Deploy technology implementation programmes in the public services of the Administration (especially Health, Justice & Education); • Facilitate the creation of new reusable solutions; • Publish a comprehensive directory of applications and/or solutions.	Red.es
	• Provide guidance in e-government, interoperability and digitisation; • Provide and supply interoperable solutions and websites.	General Secretariat for e-government

Table 26 provides an overview of existing generic organisational interoperability enablers provided by the aforementioned institutions in Spain, which desk research identified.

Table 26 Organisational interoperability enablers and artefacts in Spain

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
Strategic enablers	Strategy	There is no dedicated interoperability strategy in Spain. However, the following strategic documents stress the importance of interoperability for the digitisation of the public sector: • The Digital Agenda for Spain represents a roadmap in the field of Information and Communication Technologies (ICT) and Electronic Administration for the fulfilment of the objectives of the Digital Agenda for Europe in 2015 and in 2020. It incorporates specific objectives for the development of the economy and the digital society in Spain[92]; • The ICT Strategy 2015-2020 sets out the global strategic framework to make progress in the transformation of the Administration, set forth the guiding principles, goals and actions required to complete it, as well as the landmarks in the gradual development of Digital Government[93]. It explicitly indicates the need for promotion of standards to promote interoperability for different government systems and fields (e.g. health, education) as actions.

[92] The six major objectives of the Digital Agenda for Spain are: encourage the deployment of networks and services to ensure digital connectivity (1), develop the digital economy for the growth, competitiveness and internationalisation of the Spanish companies (2), improve electronic administration and digital public services (3), strengthen confidence in the digital domain (4), promote R&D in future industries (5) and promote inclusion and digital literacy and the training of new ICT professionals (6)

[93] The strategy sets five strategic goals: Increasing productivity and efficiency in the internal functioning of the public administrations (1), Deepening the digital transformation of the public administrations (2), Achieving greater efficiency in the

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
Tactical enablers	Framework	• The Spanish National Interoperability Framework (NIF) (2010) is a Royal decree, which sets out provisions about interoperability stated in the e-government Law (11/2007). It is applicable to all public administrations in Spain[94]. The NIF specifically addresses requirements in relation to the implementation of interoperability principles, levels, agreements and governance[95].
	Programme	• No artefact found
	Agreement	• The Declaration of Shared Services (2015) announced the introduction of 14 shared services for the State Administration[96]. A regulatory framework for the declaration of shared services also completes the declaration.
	Service catalogue	• No artefact found
	Business capability	• The General Access Point – administracion.gob.es[97] facilitates the intercommunication of citizens and businesses with Public Administrations. The portal gives access to government information, the possibility of doing paperwork and knowing at any time the state of processing of their cases[98]. It is also a key entry point to the administrative services of all three levels of Government (Central, Autonomous Communities and Municipalities); • The Red SARA network is Spain's Government intranet. It interconnects 16 ministries, all Autonomous Communities (17) and Autonomous Cities (2), as well as over 3708 local entities, representing more than 90 % of the population[99]. Red SARA's objective is to increase collaboration and interoperability among the information systems of the various levels of Government; • Cl@ve is a common platform for identification, authentication and electronic signature, a horizontal and interoperable system that avoids Public Administrations having to implement and manage their own systems for authentication and signature, and citizens having to use different methods of identification when interacting electronically with the Administration[100]. Cl@ve complements the existing systems for accessing electronically public services, based on the DNI-e (electronic ID card) and electronic certificates, and offers the possibility of signing in the cloud with personal certificates hosted in remote servers;

provision of common ICT services in the public administrations (3), Implementing the smart corporate management of knowledge, data and information (4), Developing a corporate security and usability strategy for public e-services (5)

[94] Spain NIFO Factsheet, p.1

[95] More information about the different standards of the Spanish NIF can be found on the e-government portal (PAe).

[96] The 14 services are: a unified telecommunications service (1), a managed security service (2), an ICT infrastructure hosting service (3), an hybrid cloud service (SARA Cloud) (4), a unified email service (5), a multichannel citizen service (6), a registry management service (7), a notification management service (8), a payroll management service (9), an integrated personnel management service (10), a common economic-budgetary management service (11), a common service of generation and validation of electronic signatures (12), a records management service and electronic document (13) and an electronic file management service (14).

[97] The General Access Point is also known under the code "060". The code is still used for the telephonic access to the services provided by the General Access Point

[98] Spain eGovernment Factsheet 2017, p.49

[99] Spain eGovernment Factsheet 2017, p.50

[100] Spain eGovernment Factsheet 2017, p.51

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
		• The Data Intermediation Platform is a type of horizontal service intended to simplify administrative procedures, so that citizens or businesses do not have to deliver data or documents already held by public authorities. It also reduces fraud in applications and related procedures;
	Guideline	• The CORA report is a comprehensive study of the situation of public administrations in Spain and proposes 222 measures to reform the administration, some of them being related to e-government[101]; • ¡Digitalíza-t! (2016) is a guidebook that aims to help Spain's local public administration on e-government and digitisation. The manual explains to local administrations how to transpose two national e-government laws (law 39/2015 and law 40/2015) and it also shows how to make use of ICT solutions made available by the State; • The Interoperability audit guide contains a set of appropriate mechanisms to assess compliance with the provisions of controls about the fulfilment of the requirements of the National Interoperability Framework.
Operational enabler	Business process specification	• No artefact found
	Business information exchange/interaction pattern	• No artefact found

The e-government Portal, PAe is the Public Administration's channel that unifies and centralises all available information about e-government[102]. It serves as a gateway for all information on the status, development, analysis, news and initiatives around e-government. It was created in response to the growth of e-government in the recent years. Included in this portal are the National Observatory for e-government (OBSAE), where it is possible to find reports and indicators regarding e-government and the Technology Transfer Centre (CTT), the repository of reusable solutions. The General Secretariat for e-government runs and manages the PAe portal.

The Technology Transfer Centre (CTT) facilitates the creation of new reusable solutions and publishes a comprehensive directory of applications and/or solutions, which aims to encourage the reuse of solutions for all levels of government. The website informs projects, initiatives, services, standards and solutions that are developed in e-government. It is also linked with Joinup.

3.13 United Kingdom

In the United Kingdom, the Government Digital Strategy drives all e-government related developments. The Government Digital Service (GDS), as part of the Cabinet Office and of the Efficiency and Reform Group, is the one political body governing the implementation of the Strategy. The GDS is governed by the digital, data

[101] The 'Office for the implementation of the reform of the administration' (OPERA) was created with the aim of ensuring the implementation of the measures contained in the report of the Commission for the Reform of Public Administration (CORA), to assume monitoring, promotion, coordination and ongoing evaluation, as well as to elaborate new proposals. OPERA performs an annual monitoring report both of the various subcommittees and of the CORA as the whole.

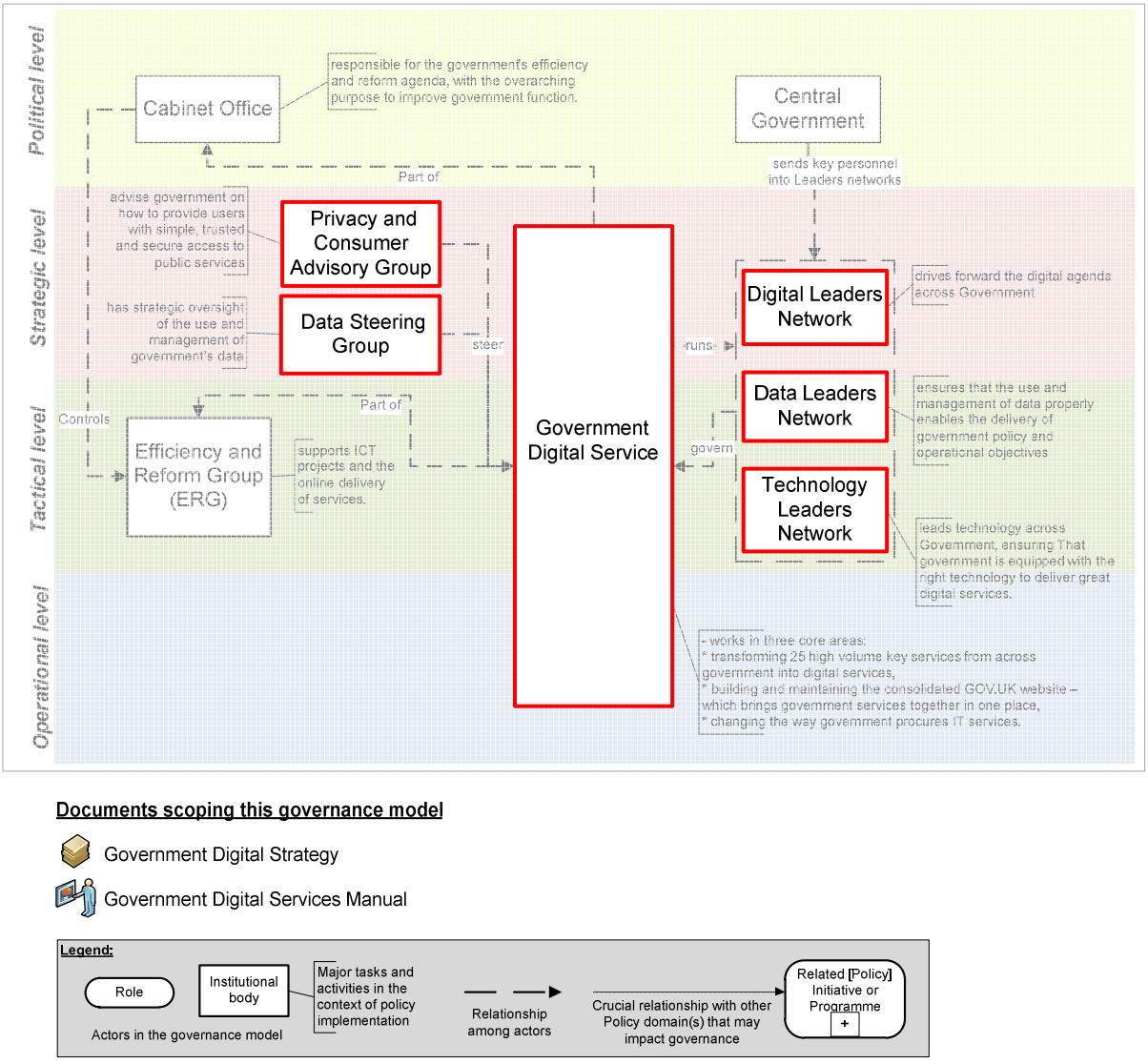
[102] Spain eGovernment Factsheet 2017, p.49

and technology leaders of the central government departments and devolved administrations, and steered by the Privacy and Consumer Advisory Group and the Data Steering Group. GDS's main objectives are to:

- provide simpler, clearer, faster access to government services and information through GOV.UK;
- transform 25 of the most used government transactions into simple digital services;
- develop the skills and expertise so government can achieve its digital and technology objectives; and
- change the way government procures digital and technology services.

The GDS has responsibilities on strategic, tactical as well as operational level in order to realise the strategy's objectives. Figure 14 depicts the governance structure of the UK highlighting responsible and/or accountable bodies for the creation and maintenance of interoperability enablers and artefacts. Their set of governance functions is outlined in Table 27.

Figure 14 Governance Structure of the United Kingdom



While the UK governance structure to realise the Government Digital Strategy focuses extensively on digital-by-default solutions, which also includes sharing and reuse of existing building blocks, a particular focus on interoperability as well as interoperable building blocks could not be detected through desk research. It should

be noted that digital-by-default does not necessarily mean that the digital-by-default public service is interoperable. Further investigation is needed to determine the role of interoperability in the UK Government Digital Strategy in relation to this principle. This will include also further insights into the governance functions put in place in UK to ensure interoperability in public service provisioning. In Table 27, a few governance functions are listed, which are relevant to ensure interoperability.

Table 27 Governance Functions in the United Kingdom

Level of Governance	Governance functions	Responsible actor
Strategic governance	• Helps to realise the benefits for users by making digital services and information simpler, clearer and faster (i.e. ensure effective implementation of the Government Digital Strategy).	Government Digital Service
	• Steers the activities of Government Digital Service.	Privacy and Consumer Advisory Group and Data Steering Group
Tactical and operational governance	• Ensures application of the Digital Service Standard; • Provides and maintain artefacts along digital-by-default public services; • Creates awareness and promotes digital-by-default services of government, which may include interoperability assets.	Government Digital Service with the respective Leaders networks

In accordance with the above introduced governance structure, only a limited set of organisational interoperability enablers and artefacts were identified as shown in Table 28. It is important to note that both the main portal gov.uk and the GDS' body of knowledge do not refer to the UK government ICT reference architecture (UKRA) or its components. It is unclear that UKRA is maintained any further.

Table 28 Organisational interoperability enablers and artefacts in the United Kingdom

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
Strategic enablers	Strategy	There is no dedicated interoperability strategy in UK. However, the UK has approved the Government Digital Strategy, which embodies interoperability objectives through the digitisation of the public sector. It even demands governance structures to be put in place for the coordination and collaboration in the sharing and reuse of interoperability enablers and artefacts.

Tactical enablers
 	
Tactical enablers
	Framework	• The National Information Infrastructure (NII) framework ensures interoperation between government services based on commonly agreed, fully documented and reliable processes and formats of the most strategically important data is held by government;
		• The UK government ICT reference architecture (UKRA) makes available a number of architecture resources in a machine-readable format. This enables the delivery of interoperable and open ICT solutions. UKRA provides common language, terms and component descriptions that can be shared and reused for common areas of business, data, application and technologies. The reference architecture contains the following elements:
		  ○ Business Reference Model (BRM);
		  ○ Information Reference Model (IRM);
		  ○ Application Reference Model (ARM);
		  ○ Technical Reference Model (TRM);
		  ○ Glossary of Terms.

Organisational Interoperability Enabler	Type of enabler	Existing artefacts
	Programme	• The Digital transformation programme[103] fosters the building up of 25 digital services as 'services digital-by-default ' that are simpler, clearer and faster to use, and that meet the needs of their users.
	Agreement	• No particular agreements found.
	Service catalogue	• No service catalogue found at national level.
	Business capability	• The Government Service Design Manual provides a relevant body of knowledge for digital-by-default services in government for distinct target audiences, including those relevant to interoperability and standards.
	Guideline	• The UK technical architecture approach provides guidelines in form of a logical approach and user-centred design to plan the structure of technology systems; • The Government Service Design Manual provides a number of guidelines on how to develop user-focused digital-by-default services in government.
Operational enabler	Business process specification	• No particular reference business processes were found
	Business information exchange/interaction pattern	• No artefacts found

The current platform gov.uk provides access to public services and it hosts a number of guidelines and strategic documents guiding the digital-by-default service implementation of government in the UK. With regard to interoperability and in particular organisational interoperability enablers and artefacts, it is rather difficult to find the relevant information. This analysis established that it was not possible to identify a repository of generic artefacts to support interoperability implementation in digital public service provisioning (apart from UKRA, which seems not to be maintained any further).

[103] The programme ran until March 2015

4 Comparison of case studies and lessons from the assessment

The governance structures of the thirteen Member States reviewed in Chapter 3 cater for the successful implementation of the underlying strategies regarding the digitisation of the public sector in different ways. All countries have in place responsible actors both at strategic and tactical/operational levels, which perform a set of governance functions to successfully implement and operationalise strategies with the relevant interoperability objectives.

Table 29 and Table 30, below, provide an overview of governance functions undertaken by respective actors in the thirteen Member States, which are, either directly or to some extent, related to providing generic interoperability enablers and artefacts as well as supportive measures. These governance functions are grouped into strategic governance (Table 29) and tactical/operational governance (Table 30). They are also available in the excel file below:

SC439 D06.01
support summary-G

The strategic governance involves rather high-level decision-making and advice on long-term strategic directions as well as high-level monitoring and coordination activities. At tactical/operational level, governance functions include:

- the provision of core enabling artefacts such as a national interoperability framework and a general reference architecture;
- the development, provision and maintenance of enabling artefacts at different layers of interoperability (e.g. service catalogue, standards, guidelines, information management);
- the involvement of relevant external stakeholders through working groups or expert groups; and
- the approval of standards as well as of supporting measures such as awareness raising and operational support in the deployment of enabling artefacts to ensure interoperability in public service provisioning.

Table 29 Overview of governance functions on strategic level and relevant actors to ensure interoperability

Governance functions		*Develop strategies for e-government, IT and IT security, including interoperability objectives*	*Prepare program(s) for digital transformation and interoperability*	*Ensure alignment between interoperability business goals and interoperability solutions*	*Govern effective implementation of strategy*	*Govern IT coordination among the relevant policy actors in the governance structure and facilitate consultation and relevant decision-making on a strategic level*	*Supervise and advice on strategic direction regarding e-government developments, including interoperability, digital service and infrastructure developments*	*Monitor interoperability maturity and achievement of interoperability goals, and provide frequent reports to the policy level on e-government developments, including interoperability achievements*	*Monitor the governance and provision of central IT infrastructure*
Responsible actor in	**BE**	Deputy Prime Minister and Minister for development Cooperation, Digital Agenda, Post and Telecom	DG Digital Transformation	DG Digital Transformation	DG Digital Transformation		DG Digital Transformation		
	DK	Agency for Digitisation		Agency for Digitisation		Agency for Digitisation		Agency for Digitisation	
	EE	Min. of Economic Affairs and Communications		Min. of Economic Affairs and Communications	Min. of Economic Affairs and Communications		E-Estonia Council		
	DE	Federal CIO				Federal CIO together with IT Council, the Conference of IT Commissioners of the (Federal) departments and the Federal IT Steering Committee	Federal Min. of the Interior (BMI), Federal CIO	Federal Min. of the Interior (BMI) and Federal CIO to the Federal Government	Federal CIO
	IT	Min. for Economic Development; Agency for Digital Italy; Min. for Simplification and Public Administration		AgID		AgID		AgID	
	LT	Min. of Transport & Communication (Information Society Development Committee), Min. of	Min. of Transport & Communication (Information Society Development Committee), Min. of	Min. of Transport & Communication (Information Society Development Committee), Min. of					

Governance functions	*Develop strategies for e-government, IT and IT security, including interoperability objectives*	*Prepare program(s) for digital transformation and interoperability*	*Ensure alignment between interoperability business goals and interoperability solutions*	*Govern effective implementation of strategy*	*Govern IT coordination among the relevant policy actors in the governance structure and facilitate consultation and relevant decision-making on a strategic level*	*Supervise and advice on strategic direction regarding e-government developments, including interoperability, digital service and infrastructure developments*	*Monitor interoperability maturity and achievement of interoperability goals, and provide frequent reports to the policy level on e-government developments, including interoperability achievements*	*Monitor the governance and provision of central IT infrastructure*
	Interior; Information Society Development Committee	Interior; Information Society Development Committee	Interior; Information Society Development Committee					
NL	Min. of the Interior and Kingdom Relations; National Council for Digital Government	National Council for Digital Government	National Council for Digital Government		National Council for Digital Government	National Council for Digital Government		
NO	Min. of Local Government and Modernisation	DIFI			DIFI	Min. of Local Government and Modernisation		DIFI
PL		Min. of Digital Affairs			Min. of Digital Affairs	Min. of Digital Affairs		
PT	AMA	AMA	Council of Ministers	CTIC		AMA		
SK	Information Society Section		Information Society Section	Slovak Government Office			Information Society Section	
ES	General Secretariat for e-government; ICT Strategy Committee	Red.es		SESIAD		SESIAD	General Secretariat for e-government	SESIAD
UK				Government Digital Service & Digital Leaders network			Privacy and Consumer Advisory Group & Data Steering Group	

Table 30 Overview of governance functions on tactical and operational level with relevant actors to ensure interoperability

Governance functions		*Provide the national interoperability framework (NIF)*	*Ensure application of the relevant standards, architecture guidelines and interoperability framework*	*Manage and maintain the central Reference Architecture*	*Identify needs and decide on strategies, architectures and standards in IT that span across departments in Federal/Central government*	*Coordinate the development and maintenance of interoperability and IT standards, including delegation of the development of architectures, standards and methods to respective government actors and working groups according to needs*	*Develop, provide and maintain artefacts (standards, guidelines, etc.) supporting interoperability enablers for public service provisioning*	*Develop, provide and maintain a catalogue of standards*	*Develop, provide and maintain a repository for sharing and reusing generic interoperability artefacts*	*Ensure effective information management / data management*	*Develop, provide and maintain a catalogue of services*	*Approve standards developed by operational group*	*Trigger supportive measures as needed to ensure and improve interoperability solutions, such as a central IT infrastructure*	*Provide consultation and body of knowledge on interoperability to strategic actors*	*Provide operational support to relevant actors when developing, deploying and operating IT standards in public service provisioning*	*Create awareness and strengthen widespread promotion and adoption of digital services of government, which may include interoperability assets*
Responsible actor in	BE	BOSA DG Digital Transformation	BOSA; CBSS		BOSA DG Digital Transformation	BOSA DG Digital Transformation			BOSA DG Digital Transformation; CBSS					BOSA DG Digital Transformation	BOSA DG Digital Transformation	
	DE		KoSIT		IT Council; IT Planning Council	KoSIT, FIM	ITZBund; BMI working groups; KoSIT	KoSIT	KoSIT	FIM	FIM	Federal CIO; IT Planning council	ITZBund	KoSIT	KoSIT	
	DK	Agency for Digitisation	Agency for Digitisation; Steering Committee for Data and Architecture	Steering Committee for Data and Architecture	Steering Committee for Data and Architecture	Agency for Digitisation	Agency for Digitisation	Agency for Digitisation	Agency for Digitisation		Agency for Digitisation		Agency for Digitisation	Steering Committee for Data and Architecture	Agency for Digitisation	Agency for Digitisation
	EE	Min. of Economic Affairs and Communications	RIA	RIA	Min. of Economic Affairs and Communications		RISO		RISO		RISO	E-Estonia Council	E-Estonia Council			E-Estonia Council
	IT	AgID	AgID				AgID	AgID	AgID	Min. for Simplification and Public Administration			AgID	Min. for Simplification and Public Administration		AgID
	LT	Min. of Transport & Communication (Information Society Development Committee), Min. of Interior; Information Society Development Committee	Min. of Interior			Min. of Transport & Communication; Min. of Interior	Min. of Transport & Communication		Min. of Interoperability		Min. of Transport & Communication		Min. of Transport & Communication	Min. of Transport & Communication		
	NL	Min. of the Interior and Kingdom Relations	BZK	ICTU	Directing Boards	Directing Boards; ICTU; Logius	ICTU; Logius	ICTU; Logius	Logius		ICTU; Logius		Logius	ICTU; Logius; Directing Boards	Logius; Directing Boards; ICTU	Directing Boards; ICTU
	NO	DIFI	DIFI		Min. of Local Government and Modernisation; DIFI	Min. of Local Government and Modernisation; DIFI	Min. of Local Government and Modernisation; DIFI; Brønnøysund Register Centre	DIFI	Brønnøysund Register Centre	Brønnøysund Register Centre	Difi; Brønnøysund Register Centre		Min. of Local Government and Modernisation; Brønnøysund Register Centre	DIFI	DIFI; Min. of Local Government and Modernisation	DIFI
	PL		Min. of Digital Affairs	Min. of Digital Affairs			Min. of Digital Affairs	Min. of Digital Affairs	Min. of Digital Affairs	Min. of Digital Affairs	Min. of Digital Affairs			Min. of Digital Affairs	Min. of Digital Affairs	Min. of Digital Affairs
	PT	AMA	AMA			AMA	AMA	AMA	AMA		AMA		CTIC		AMA	CTIC
	SK	e-government Architecture Office	e-government Architecture Office	e-government Architecture Office	e-government Architecture Office	e-government Architecture Office	e-government Architecture Office	Information Society Section	Information Society Section		Information Society Section		Information Society Section	Information Society Section		Information Society Section
	ES	Min. of the Presidency	General Secretariat for e-government		CORA	General Secretariat for e-government	General Secretariat for e-government; Red.es	Red.es	SEFP		SEFP; Red.es			General Secretariat for e-government	General Secretariat for e-government; Red.es	SEFP; Red.es
	UK					GDS	GDS with the respective Leaders networks								GDS with the respective Leaders networks	GDS with the respective Leaders networks

It is worth mentioning that the analysed smaller countries have fewer actors taking care of relevant interoperability governance functions, while the federal structure in Germany or the decentralised structure in Spain entails larger numbers of actors. Another observation is that the Denmark, Italy, Norway, Portugal and UK have introduced single institutional bodies to take care of the governance functions across all governance levels. However, this makes it rather difficult to separate key interoperability activities from the public service provisioning governance functions. The analysis of existing governance functions offers a first indication of generic governance functions that Member States need to put in place in to ensure successful implementation of interoperability objectives along with digital public service provisioning.

Some further insight can be drawn from the types of actors catering for interoperability objectives and achievements. At the strategic level, different coordination bodies assist Ministries. Thus, on the one hand, dedicated Ministries play a crucial role in all studied Member States apart from the UK and Portugal. These Ministries (Deputy Prime Minister's Office for Investments and Informatisation, Ministry of Interior, Ministry of Finance, Ministry of Economic Affairs, Ministry of Finance and Public Administration etc.) may be responsible for different policy domains.

On the other hand, some Member States have established coordinating bodies that link responsible actors of the different Ministries to take decisions, to advice the government or responsible Ministries, to plan future strategies or to monitor the maturity and governance of interoperability overall. As examples, there is the Steering Committee for Data and Architecture (DK), the E-Estonia Council, the IT Council and IT-Planning Council (Germany), the National Council for Digital Government (Netherlands), the Council for Information and Communication Technologies in ¨Public Administration (Portugal) or the 'Leaders Networks' or Advisory and Steering Groups (UK).

Member States have different approaches to take care of the development, provision and maintenance of organisational interoperability enablers and artefacts, of supportive measures and to ensure the operative management and governance of interoperability. For instance, Estonia and the UK have operative units within the E-Estonia Council or Government Digital Service. Slovakia, Lithuania, Poland and Belgium apply the same approach, but within respectively the Deputy Prime Minister‘s Office for Investments and Informatisation (Slovakia), the Ministry of Transport and Communication (Lithuania), the Ministry of Digital Affairs (Poland) and the FPS Policy and Support (Belgium). The Netherlands has established a body (Logius) catering for these governance functions. This is also the case for Denmark (Agency for Digitisation), Italy (Agency for Digital Italy), Norway (Difi) and Portugal (Agency for Administrative Modernisation). Germany, being the largest and having a federal government system, masters governance functions through different bodies, such as at strategic level IT Planning Council and Federal CIO, and on tactical and operational level dedicated institutions such as KoSIT, ITZBund or FIM. This is also the case for the decentralised system of Spain with the Commission for the Reform of Public Administration (CORA), the General Secretariat for e-government and the State Secretariat for the Public Function (SEFP).

Furthermore, Table 31 presents an overview of the provision of organisational interoperability enablers and artefacts.

Table 31 Overview of organisational interoperability enablers and artefacts

Org IOP Enabler	Type of enabler	BE	DK	EE	DE	IT	LT	NL	NO	PL	PT	SK	ES	UK
Strategic enablers	Strategy	?	?	?	?	?	?	?	?	?	?	✓	?	✓
Tactical enablers	Framework / Reference architecture	✓	✓	✓	?	✓	?	✓	✓	✓	✓	✓	✓	✓
	Programme	✓	✓	X	?	✓	✓	✓	✓	✓	✓	✓	X	✓
	Agreement	✓	✓	✓	X	✓	X	✓	X	✓	X	X	✓	X
	Service catalogue	✓	✓	✓	✓	✓	✓	✓	✓	?	✓	✓	X	X
	Business capability	✓	X	X	✓	X	✓	✓	✓	✓	X	X	✓	✓
	Guideline	X	✓	✓	✓	✓	X	✓	✓	X	X	X	✓	✓
Operational enabler	Business process specification	X	X	X	✓	X	X	?	✓	X	X	X	X	X
	Business information exchange/interaction pattern	✓	X	✓	✓	✓	X	X	✓	X	✓	X	X	X

Legend:	
✓	Yes, there is artefact(s) in the Member state
?	Maybe, there is another artefact, which fulfils the role of the enabler, while not exactly corresponding.
X	No artefacts found in the Member state

Table 31, above, shows that none of the countries has a separate interoperability strategy as organisational interoperability enabler in place corresponding to the European Interoperability Strategy[104]. However, the relevant strategic documents on digitisation and information society of the Member States encompass interoperability objectives. In addition, Member States differ in their approach to develop interoperability artefacts and enablers: while most countries have strategies or digital agendas in place to lead their digital transformation, Lithuania and Poland put the concept of programmes in a similar position.

Eleven of the thirteen countries (Belgium, Denmark, Estonia, Italy, the Netherlands, Norway, Poland, Portugal, Slovakia and United Kingdom) have established a national interoperability framework (NIF), while Germany and Lithuania do not have such an interoperability framework. However, these countries have technical frameworks in place, such as SAGA 5.0 or the XÖV framework in Germany or different programmes in Lithuania. To complement the NIF, several countries (Belgium, Estonia, Netherlands, Poland and Slovakia) also have a reference architecture (or more than one) to foster the sharing and reuse of interoperability artefacts as well as to disseminate the relevant knowledge. The UK seemed to have such in place as well up to recently. However, from the Government Digital Service web page gov.uk, no indications are provided as to whether UKRA is still applied, maintained and valid.

From other technical enablers, the most prevalent are programmes and service catalogues – both in 10 countries. The others have a bit less with agreements (7 countries), business capabilities (8 countries), and Guidelines (8 countries).

[104] This refers to the European Commission, "Annex 1 to the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of Regions 'Towards interoperability for European public services'," Brussels, 2010, also known as the European Interoperability Strategy.

Interestingly, artefacts of operational enablers of organisational interoperability are scarcely in place. Germany offers a reference process library at local level, while only Norway offer business specifications. Belgium, Italy, Norway, Portugal, Germany, and Estonia offer business information exchange patterns, which span across several interoperability layers.

Supportive measures in form of a shared repository are in place in all of the studied countries, e.g. Estonia (RIHA), Germany (e.g. XRepository, DVDV, KGSt® reference process library), and Slovakia (MetaIS).

5 Organisational interoperability guidelines

Based on the insights of lessons from the previous chapter as well as of the insights gathered in deliverables D03.01 Interoperability governance models (SC439), the project team herewith derives the following five guidelines to effectively cater for organisational interoperability realisation, enriching the ones presented in D05.02 Organisational interoperability guidelines from SC288 EIS Action Review Follow-up.

The Member States and European Institutions should **ensure to have in place the relevant organisational interoperability enablers and artefacts** depending on the governance level:

- **On the strategic level:** Member States and European Institutions should have in place an interoperability strategy. Optionally, they can cater for the relevant interoperability objectives by embedding them in strategies for public services digitisation in order to cover explicitly strategic goals of interoperable public service provisioning as has largely occurred in the countries analysed in this study. Depending on the organisation of the country / EU institution, the strategy should be either generic and applicable to all policy areas in the public sector, or sector-specific. It is highly recommended to ensure compliance of the strategy with the European Interoperability Framework - Implementation Strategy (Interoperability Action Plan) (2017)[105].
  Each strategy should be frequently monitored and reviewed to assess the achievement of its objectives, to take countermeasures if objectives are not achieved and to adjust the strategy to newly emerging needs. The project team suggests a **bi-annual review** of the strategy.

- **On the tactical level:** Member States and European Institutions should maintain and sustain the necessary frameworks and reference architectures ensuring effective implementation of interoperability in the development and provisioning of public services. Furthermore, interoperability agreements can foster the use of available interoperability artefacts on all layers of the European Interoperability Framework and throughout all levels of government. The project team highly recommends Member States to seek compliance with the European Interoperability Framework (EIF) and the European Interoperability Reference Architecture (EIRA). The European Commission should continue to maintain and govern these artefacts to ensure their sustainable use and relevance.

- **On the operational level**: Member States and European Institutions are advised to adopt and deploy European architecture and solutions' building blocks provided at organisational level for interoperable cross-border public service provisioning. If not available at European level, Member States are recommended to seek partnerships with other Member States to develop new interoperability artefacts such as collaborative business process models and business interaction patterns, in particular in cross-border process orchestrations.

The Member States and European Institutions should further **ensure the proper organisational structures to implement effectively the interoperability objectives, to arrange the provision of the relevant**

[105] COM(2017) 134, Annex 1 to the to the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 'European Interoperability Framework - implementation strategy Interoperability Action Plan', Brussels, 23.3.2017

interoperability enablers and artefacts (see above) **and to align with the European interoperability objectives**. This means that responsible institutions are in place with responsibility to provide the organisational interoperability enablers and artefacts at strategic, tactical and operational level. The study at hand presents insight into 13 cases of organisational structures to cater for organisational interoperability enablers.

In addition, the organisational structure as suggested above needs to **foresee appropriate involvement and possibilities of relevant stakeholders to exert their 'voice'** as is stressed in deliverables D03.01 (SC439) when studying the generic governance structures as well as in D04.01 (SC439) for the e-procurement cases. The involvement of relevant stakeholders in the development and sharing of organisational interoperability enablers and artefacts is necessary as they determine the requirements for, and the reuse of interoperability enablers and artefacts.

The Member States and European Institutions should **ensure the existence of the necessary support mechanisms** for the effective implementation of European and national interoperability objectives as already stressed in deliverable D02.03 European organisational interoperability vision (SC117)[106]. The project team highly recommends the following support mechanisms:

- **Relevant repositories** for openly sharing and reusing architecture and solution building blocks at all layers of interoperability as proposed by the EIF (i.e. legal, organisational, semantic, technical)[107]. The thirteen cases studied in this report show examples of such repositories (e.g. the Central meta information system of public administration (MetaIS) in Slovakia). However, there is also room for improvement in some of the existing cases to provide an integrated and comprehensive repository for all levels of government that is structured along the EIF layers of interoperability
  Existing repositories can be further improved by providing simple, easy to find and access artefacts and body of knowledge. They should further include meta information for each artefact and information on how to integrate and use the available artefacts in public service provisioning.

- The repository should also include a **catalogue of services** and **catalogue of standards**, which provides a full list of available (aggregate and basic) public services as well as available standards for cross-organisational and cross-border business information exchanges or interaction patterns. Such a catalogue needs to go beyond the mere listing of services as is standard in online portals deployed currently. These catalogues should be openly accessible and easy to find for the targeted user groups and it should contain the relevant (meta)information and code snippets on how to address and integrate them into compound public services.

- Beside the repository with the catalogue of services and catalogue of standards, the responsible actors (see guideline on institutional structures above) must **have in place the competencies and knowledge** required for providing and developing interoperability enablers and artefacts at all layers of the EIF, as well as for deploying and reusing the provided artefacts. If such knowledge and competencies are not in place, the project team recommends actors to take measures to increase

[106] This official deliverable is part of the previous Specific Contract No 117 under ABC III Framework Contract.

[107] COM(2017) 134, Annex 2 to the to the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 'European Interoperability Framework - implementation strategy', Brussels, 23.3.2017

these skills by offering relevant training and by building up a body of knowledge to provide the required interoperability enablers and artefacts.

Two preconditions are relevant for the successful knowledge development at national level: (1) A close collaboration and alignment with the European level initiatives is crucial to ensure a common understanding of interoperability and to exploit the synergies of joint and collaborative initiatives. (2) The taken measures should reflect and meet the targeted users' needs, i.e. of those that need to integrate interoperability enablers and artefacts into public service provisioning.

The Member States and European Institutions should **ensure adequate governance functions with clearly assigned roles and institutional actors** catering for the promotion, adoption, maintenance, sustainability and monitoring of successful interoperability implementations. The above guidelines will only be successful if they are integrated and governed effectively. This means that the suggested institutional structures need to have clearly defined responsibility to coordinate and govern the provision and use of interoperability enablers and artefacts at all layers of the EIF. The thirteen cases studied in this report provide examples of the kind of governance responsibility that should be attributed at strategic, tactical and operational levels of governance. In this regard, we argue that the different cases demonstrate variations of successful governance structures, yet there is not 'one' optimal governance structure to recommend. In fact, the comparison of the case studies in section 4 demonstrates that there is still potential to improve the effectiveness and efficiency of existing governance models.

To gather further insights into the impact of interoperability governance and into the interdependencies among generic interoperability governance and the public service governance as is depicted in the new EIF version, further research will be needed. Such research could study the acceptance and adoption of generic interoperability enablers and artefacts in public service provisioning. It could also investigate the performance of interoperability governance in the interplay with public services governance to improve understanding of interdependencies and caveats.

Further research could also shed light on organisational interoperability in open government data initiatives since open government data have a particular need for being interoperable and for following standards.

6 Glossary

Interoperability strategy: Interoperability Strategy specifies the objectives of interoperability and includes interoperability elements such as commitments, methods and the use of standards and tools. Such strategy should support European public administrations to implement interoperability aligned with strategic goals and based on a clear focus, matching expectations and fulfilling the needs for implementing interoperable public services. An Interoperability Strategy is foremost generic (e.g. the DSM) and should be implemented in different policy domains. A policy domain might also have a specific interoperability strategy or dedicated interoperability principles.

Interoperability framework: as described in the Decision (EU) 2015/2240, an interoperability framework is an agreed approach to interoperability for organisations that wish to work together towards the joint delivery of public services. This framework, within its scope of application, specifies a set of common elements such as vocabulary, concepts, principles, policies, guidelines, recommendations, standards, specifications and practices.

Interoperability agreement: Interoperability agreements, as well as Service Level Agreements (SLAs) foster collaboration across organisations. They aim to improve trust and reliability when designing and providing cross-organisational and pan-European public service through agreed-upon principles and commitments. Such agreements may be provided as generic agreements or specific to a given policy domain (the regulation of the use of a common transport infrastructure protocol through a transport infrastructure agreement would be generic, while the agreements and adherence to the use of the CEN BII profile Advanced Tendering would be specific to the public procurement policy domain;

Service catalogue: A catalogue of public services, which is generic in the case where all relevant end-to-end public services are listed across all policy domains, and specific in the case where the domain maintains its extract of public services relevant only within the domain. The role of the latter should not be underestimated in terms of operationalisation and application of interoperability enablers and artefacts through concrete instantiations. It also provides a summary of the service portfolio of a country and is therefore a tactical enabler.

Business capability: Business capabilities and values ensure that the competencies, trust and capabilities are available to collaborate seamlessly across organisations in achieving interoperability in a given context by deploying the proper enablers and artefacts of interoperability. This enabler is both, generic and specific: generic with regard to the capabilities needed to implement interoperability overall; specific concerning the capabilities to deploy the specific interoperability enablers and artefacts relevant within a given policy domain;

Guideline: Business process specifications provide business-focused conceptual descriptions (process models) of collaborations across organisational boundaries to ensure alignment of processes and seamless interaction among agencies in public service provisioning in an interoperable way. Process models are mostly specific within a given policy domain. However, some could also become generic if the end-to-end service is common across different policy domains (e.g. a service for proofing qualification, an identification service, etc.);

Business information exchange: Business Information Exchanges provide Interaction Patterns that enable seamless exchange of information in a standardised and harmonised way thereby ensuring effective and efficient

implementation of interoperability. Business Information Exchange is mostly specific within a given policy domain. Nevertheless, some artefacts could also become generic if the end-to-end service is common across different policy domains. For example, this could include a service to deliver documents from party A to party B through a common generic eDocument container as developed in eSENS, an eDelivery service that can be used across different domains (as developed in eSENS), a business register service providing basic information on a business independent of the policy domain and relying on a common Business Information Exchange building block, etc.);

Organisational Interoperability Enablers: crucial elements that need to be put in place by a European public administration to implement organisational interoperability. They can be classified into strategic, tactical and operational enablers.

Organisational Interoperability Artefacts: tangible implementations to realise the crucial elements of organisational interoperability enablers and they serve as blueprints of solutions and artefacts supporting instantiations of organisational interoperability enablers, fostering also sharing and reuse of enablers and artefacts.

Organisational Interoperability is concerned with setting the foundations for collaboration between organisations, such as public administrations in different Member States, in order to achieve their mutually agreed goals in providing interoperable public services that reflect the users' (i.e. citizens, businesses, NGOs or other government organisations) needs. Setting the foundations for collaboration among organisations refers to aligning cross-organisational business processes and smart service orchestration thereby ensuring seamless interaction and data exchange among distinct systems using standards and common interoperability interfaces. Organisational interoperability encompasses the necessary strategic, tactical and operational enablers as well as the respective artefacts implementing these enablers