



European
Commission

Factsheet:

Access to Base Registries in Estonia

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Estonia towards Interoperability

Estonia is one of Europe's success stories of the last decade regarding the delivery of electronic public services and electronic government in general. They are proud to offer a large pool of services, which eventually access base registries, to be consumed by the citizens from anywhere and using any device. Voting in elections, managing tax returns or even registering a business online are only some examples of how Estonia understands the **Life in the Digital Society**.

The immediate benefits resulting from this fully ICT-based approach are an increased level of transparency and accessibility in government, an improved interaction between government bodies, including citizens and businesses, a modern administration getting rid of old-fashioned bureaucracy, and a successful setting for business.

The Estonian e-Government style permits the **Estonian Interoperability Framework** to be exemplary regarding the alignment with the terminology and general principles of the EIF. One of the most remarkable examples of this alignment, related to base registries in general and the "Only-Once" principle in particular, is the EIF **Underlying Principle 9: Administrative simplification**. In this regard, the Estonian framework ensures its compliance with the EIF through the fact that "when the documentation of databases is coordinated in the Management System of State Information System (**RIHA**^{1 2 3}), the purposefulness of data collection and compliance with the principle of a single request for data are checked".

The framework is divided into two levels: the framework itself, including a list of documents, a glossary, concepts, principles, policies, guidelines, recommendations and practices, and a second level, which includes information on the service model regarding the interoperability levels (political, legal, organisational, semantic and technical).

The digital trend continues in Estonia with other relevant initiatives, also aligned with the Estonian Interoperability Framework, such as the **Development plan of Estonian information society by 2020**⁴ and the **Digital Agenda 2020 for Estonia**⁵, which are aligned regarding goals and projects.

One of these projects is the creation of the **Nordic Institute for Interoperability Solutions** - an international development centre for the development of **X-Road**⁶, e-identity, digital signature and other components of the basic service infrastructure - to enhance the provision of cross-border e-services and eGovernment services. To support this, Estonia considers that it would be practical for countries to join forces rather than develop the necessary basic services infrastructure on their own. Currently, the institute is founded jointly by Finland and Estonia. As a consortium, it will be open for other partners to join and more countries are expected to join the partnership.

According to the Digital Agenda 2020⁷ for Estonia, it was estimated that 20% of the active population in the EU should be using digital signatures by 2020, thus allowing to expedite business operations and facilitate management of personal matters. The take-up of **digital signatures** will be one of the primary goals of Estonia's foreign policy in the field of ICT and one of the priorities of Estonia's EU presidency starting July 2017.

Regarding **data protection**, Estonia has created both technological and organisational conditions to ensure

¹ <https://www.riigiteataja.ee/akt/129032016006>

² <https://moodle.ria.ee/course/view.php?id=3>

³ <https://riha.eesti.ee/riha/main>

⁴ <https://www.mkm.ee/et/arengukavad#infoyhiskond>

⁵ https://www.mkm.ee/sites/default/files/digital_agenda_2020_estonia_engf.pdf

⁶ <https://e-estonia.com/component/x-road/>

⁷ https://e-estonia.com/wp-content/uploads/2014/04/Digital-Agenda-2020_Estonia_ENG.pdf

that citizens could always know who, when, and why the public administration is using their data. The implementation of this is an ongoing action.

Estonia is the first country to offer **e-Residency**^{8 9}, a transnational digital identity available to anyone in the world who is interested in administering a location-independent business online, offering secure and convenient services not only to Estonian citizens, but also other countries.

Another target for Estonia is to establish the concept of **data embassy**. This means that digital copies of all data and information systems critical to the functioning of the state will be securely preserved in “virtual data embassies”¹⁰ located in other countries. This will enable Estonia to ensure the continuity of the state public services, making the country more resilient in times of crisis.

⁸ <https://goo.gl/O5cQwI>

⁹ <https://e-estonia.com/e-residents/about/>

¹⁰ https://www.mkm.ee/sites/default/files/implementation_of_the_virtual_data_embassy_solution_summary_report.pdf

Legal Interoperability

The concept of a base registry is phased out in Estonia. Instead, they have **databases**, which are regulated by law (some of them are established by government regulation in secondary laws) as **primary sources of basic data**, therefore **unique data**. Hence it is understood that in Estonia, all registries are base registries.

Some examples of such legal provisions for specific base registries are:

- The **Business Registry** is covered by the Commercial Code¹¹ and its Amendment¹². The law expresses the basic principles of Estonian entrepreneurship and regulates any company formation in Estonia. Company registration in Estonia can be performed electronically. The information that was previously requested at the Commercial Registry Office can be submitted via the internet.
- The **Population Registry** is regulated by the Population Registry Act¹³. It provides information regarding its data composition, the procedure for the introduction and maintenance of the Registry, processing and access to its data, the entry of data on residence in the population registry and the supervision over the maintenance of the population registry. The purpose of this Act is to ensure the collection of main personal data of the subjects of the population registry in a single database for the performance of functions of the state and local governments.
- The **Land Registry** is set out in the Land Registry Act¹⁴, which stipulates the maintenance procedure of the land registry, the data content, the land registry entries, the reservation, documents necessary for registration, corrections of entries, access and extracts, etc.
- The **Vehicle Registry** is established by the General Traffic Act¹⁵. The law specifies the content of the Registry, by which ministry will it be governed, what data is contained and who may access it.

Furthermore, a number of relevant legislations regarding Estonia's interoperability and base registries access are:

- **Public Information Act**¹⁶, which ensures that citizens, businesses and other branches of public administration have access to the information meant for general use. The Act's purpose is to create public control mechanisms over the fulfilment of public duties. The "Only-Once" principle, it prohibits the use of different databases for the collection of the same data. Databases are coordinated by the **State Information Management System RIHA**¹⁷, where the justification for the data collection and compliance with the principle of a single request for data is verified.
- The **State Information Management System (RIHA)**¹⁸, which is a national information system directory, has as its objectives the assurance of transparency in managing the state information system, the planning of state information management and the support of interoperability for databases of the state, local governments and private persons fulfilling their public duties.
- The **Data Exchange Layer of Information Systems (X-Road)**¹⁹, which is a tool that connects the

¹¹ <https://www.riigiteataja.ee/akt/128122011050?leiaKehtiv>

¹² <https://www.riigiteataja.ee/en/eli/504042014002/consolide>

¹³ <https://www.riigiteataja.ee/en/eli/516012014003/consolide>

¹⁴ <https://www.riigiteataja.ee/akt/12769835>

¹⁵ https://www.riigiteataja.ee/en/compare_original?id=507012014005

¹⁶ <https://www.riigiteataja.ee/akt/122032011009>

¹⁷ <https://riha.eesti.ee/riha/main>

¹⁸ <https://www.riigiteataja.ee/akt/13147268>

¹⁹ <https://www.riigiteataja.ee/akt/127092016004>

registries in Estonia. The regulation sets requirements for the data exchange layer of information systems, its use and management. The server adapter X-Road is the key enabler for the principle of not duplicating data in different locations, thus allowing unique and accurate data to flow out from the offices of state and local governments to the end users.

- **Electronic Identification and Trust Services for Electronic Transactions Act**²⁰ stipulates the terms of usage for digital signatures, as well as the surveillance procedure over certification and time stamp services.

The Government of the Republic of Estonia has approved the **Green Paper on Open Data**²¹ under the leadership of the Ministry of Economic Affairs and Communications. The purpose of this document is to provide an analysis of the situation in the public sector open data in Estonia and make proposals for the usage of the public sector information. According to the Green Paper, open data means public and free information for all to use in a machine-readable format, with no restrictions on the use and dissemination. Open data is not considered to be personal information, and therefore it is not restricted data. Thus, there are no legal limitations for its reuse and sharing.

Other important pieces of legislation and initiatives in Estonia referring to open data are:

- The Estonian **Constitution**²², stating the right to freely obtain information disseminated for public use.
- The **Public Information Act**²³, which covers the provisions of the EU Directive 2003/98/EC on the **Reuse of Public Sector Information (PSI Directive)**²⁴. It ensures that everyone can freely access the data contained in the databases and require that the information made public is updated or corrected, allowing as well its download in a machine-readable form.
- The **Open Data repository**, intended for the pooling of public data sets. Opening the data is part of the Estonian Digital Strategy. The purpose of opening up data is for businesses to create new innovative products and services, for individuals to develop community services, analyse social trends or use the data for other individual or joint activities.

One of the most relevant legal constraints identified is the **Personal Data Protection Act**, which prescribes a person's fundamental rights and freedoms in line with public interests when his or her personal data is processed. Thus, any subject violating the Personal Data Protection Act will be dealt with by the **Data Protection Inspectorate**.

²⁰ <https://www.riigiteataja.ee/akt/125102016001>

²¹ https://opendata.riik.ee/sites/default/files/manuals/avaliku-teabe-masinloetava-avalikustamise-roheline-raamat-20141125_0.odt

²² <https://www.riigiteataja.ee/akt/127042011002>

²³ <https://www.riigiteataja.ee/akt/122032011009>

²⁴ <https://ec.europa.eu/digital-single-market/en/news/implementation-psi-directive-estonia>

Organisational Interoperability

In Estonia, the **administration** of the specific base registries takes place at the national level through their respective Ministries/Authorities. Coordination of base registries is carried out both at central, as well as at decentralised level. Accordingly, the responsibilities of coordinating the State Information System are divided into several levels. The following table gathers the main base registries, the public administration bodies to which they belong and the master data type/s they handle:

Base Registry	Authority	Master Data
Population Registry	Central Government, IT and Development Centre of the Ministry of the Interior	PERSONAL DATA (NATURAL PERSONS)
Vehicle Registry	Central Government, Estonian Road Administration	VEHICLES
Tax Registry	Central Government, Tax and Customs Board	TAX
Commercial Registry	Centre of Registries and Information Systems, Tartu County Court	BUSINESS (LEGAL PERSONS)
Land Registry	Centre of Registries and Information Systems, Ministry of Justice	PROPERTY NUMBER, NAME, TYPE, CADASTRE CODE

From the political **coordination, management and financing** point of view, the coordinator of interoperability initiatives is the Ministry of Economic Affairs and Communications. The Ministry of Economic Affairs and Communications (MKM), as the Ministry responsible for developing the state information system, is responsible for designing the interoperability framework and related documents.

The **Department of State Information Systems (RISO)** of the Ministry of Economic Affairs and Communications, coordinates the state's IT-policy actions and development plans in the field of state administrative information systems (IS), such as IT legislation, coordination of IT projects, coordination of cyber security field, standardisation, and international cooperation in the field of state IS.

The **Estonian Information System Authority (RIA)**, which is also operating in the administrative area of the Ministry of Economic Affairs and Communications, is responsible for the development and administration of the state's information system. It advises the providers of public services on how to manage their information systems and monitors them. RIA is responsible for the RIHA and X-Road.

The **organisation and implementation** activities are carried out by several entities such as IT departments of ministries, IT units of subsidiaries, Cross-departmental competence centres (Estonian Information System Authority, Estonian Land Board, Statistical Office), Private Service providers for citizens and state institutions among others.

In terms of registries, the **Centre of Registries and Information Systems²⁵ (RIK)**, under the Ministry of Justice, develops and administrates information systems and registries such as the e-Business Registry, the e-Notary system, the e-Land Registry, the information system of courts, the Probation Supervision Registry, the Prisoners Registry, the Criminal Records Database, the e-File, the electronic State Gazette,

²⁵ <http://www.rik.ee/en>

etc.

The responsibility of **Surveillance** activities is shared between the Data Protection Inspectorate, the Technical Surveillance Authority, the Consumer Protection Board, the Estonian Competition Authority, the National Audit Office, the Ministry of Economic Affairs and Communications and the Estonian Information System Authority.

In Estonia, there is a certain **criterion or legal provision for the establishment of databases**²⁶, which describes the data structure, type of data to be entered, and also information on data access. It is important to note that it is forbidden to establish a uniform set of data to collect separate datasets. Before the establishment or change in the composition of the collected data, one must coordinate the completion of the technical documentation of the database with the Ministry of Economic Affairs and Communications, Data Protection Inspectorate and Statistics Department.

²⁶ <https://www.riigiteataja.ee/en/eli/518012016001/consolide>

Semantic Interoperability

The semantic assets' objective is to reduce the time required for the integration of national systems and to enable quick and appropriate information exchange. This requires clear national rules and agreements on definitions and the use of common standards.

RIHA is the Estonian catalogue of public sector information systems, components, services, data models, etc. RIHA is also a complete and up-to-date source of metadata for the Estonian public sector.

Another action toward the integration of registries is the semantic description of databases and data structures, which includes the description of each data element. The used languages are XML for data structures and XMI for all types of database schemas

Another important resource, regarding syntactic interoperability assets in Estonia, is the **Records Management Metadata**²⁷, which offers tools for managing records and information in a digital environment. Records management metadata are essential for proving the authenticity of records and for associating records with context. The existence of metadata allows organisations to archive and reuse records. The records management metadata set includes XML schemas, which organisations can implement directly in their information systems and customise as needed.

In terms of open data, the **Green Paper on Open Data** defines the concept of the dataset as a collection of the plain text files as well as a set of machine-readable data (for example, CSV-or XML-format exported from the database or Web service, which allows the search and download of all the data in the database without restrictions, for example, the JSON-or XML-format). It also advises using open standards for open data (e.g. Dublin Core, FOAF, ADMS, DCAT, SDMX, etc.)

²⁷ https://www.mkm.ee/sites/default/files/records_management_metadata_en.pdf

Technical Interoperability

In the **Public Information Act**, a **database** is defined as the information system operated by a public body (or a private person performing public functions), which contains a set of processed unique data. Accordingly, the **State Information Management System (RIHA)** is defined as a system consisting of databases, including those which interface with the **Data Exchange Layer of Information System (X-Road)**. In Estonia, the databases are accessed via X-Road. However, when accessing the information from a database, the user is in fact directly accessing data which is stored in a number of relevant decentralised offices, rather than a centralised base registry.

State Information Management System (RIHA)

The objective of RIHA is to ensure the interoperability of public sector information systems and the reuse of technical, organisational and semantic resources. RIHA is a major state registry, as well as a **catalogue of services and principles**, containing the list of all functional databases. Technically, RIHA is a secure web-based database and software application. It ensures that no registry collects the same data.

In its role as the catalogue of Estonian public sector information systems, RIHA serves as the national registry of systems, components, services and data models, thus facilitating information system planning and operational activities.

The **description of each service** in RIHA contains the syntax of the use of the service (for example, in the case of X-Road services it is described in the Web Service Description Language, WSDL, file); the provision policy of the service (on what grounds, to whom and why the service is provided); and the quality indicators of the service (service functionality, operating reliability and efficiency).

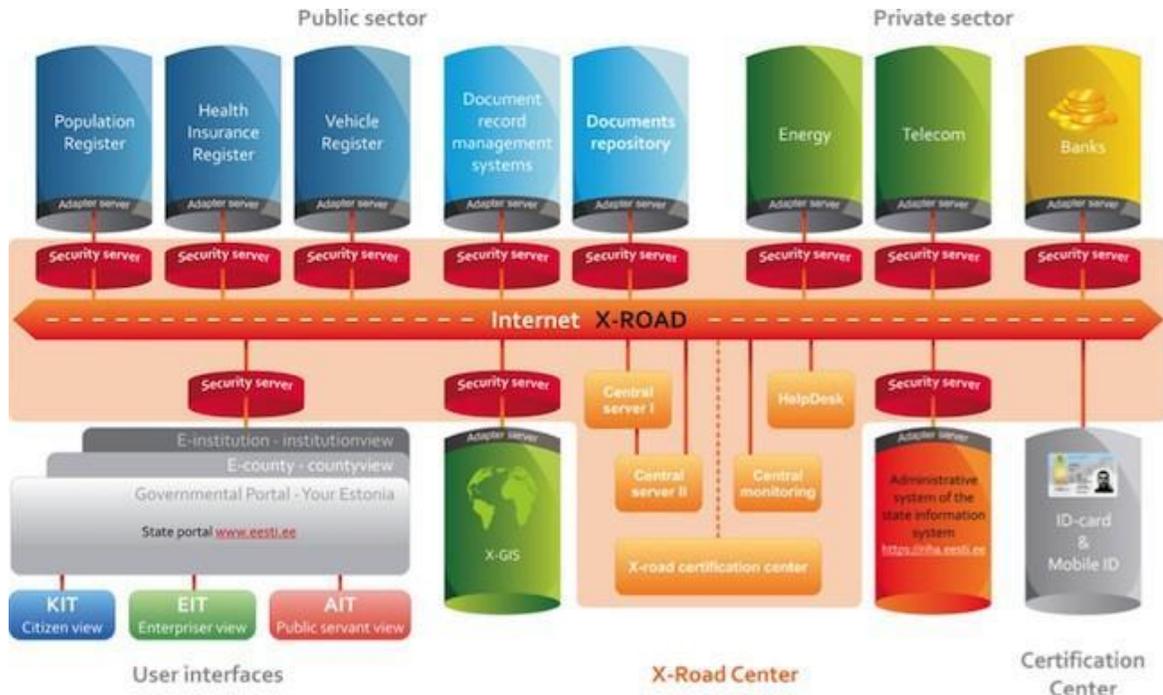
The registration of public databases and information systems on RIHA is mandatory and enforced by law and to fully implement transparency in its activities, RIHA, as an open registry²⁸, shows the profile information that is held in each government system, what reason it is held for and who can it be accessed by. It also shows the formats and data standards that each system is using.

An additional transparency feature enables people in Estonia to see which officials have viewed their data. It is against the law to view someone's data without justified reasons, and to ensure that this is respected, all access is logged. These logs display which has been viewing the citizen's information. One could see, for example, that a doctor had accessed a person's health records, followed by access to the pharmacist to obtain details of the prescription required in a paperless manner. The fact that the citizen can view and monitor the activities involving his/her personal data implies that the citizens are in control of their data.

²⁸ <https://riha.eesti.ee/riha/main>

Data Exchange Layer of Information System (X-Road)

In this model, decentralisation combined with interconnectivity prevails, since there is not a central database. Instead, every stakeholder (government department, business or even individual) has the freedom to choose their system. X-Road is the middleware which connects all the decentralised components together.



X-Road is a solid backbone that has enabled the creation of various innovative e-solutions. The X-Road interoperability platform is comprised of the core technology (Unified eXchange Platform), integration interfaces (portals, adapters, etc.), trust services, and the surrounding regulatory framework. It contains its own **Public Key Infrastructure (PKI)**, which guarantees confidentiality, integrity, traceability of the exchanged data, secure digital authentication and signing. The infrastructure also allows data forwarding through the use of an encrypting key pair: a public encryption key and a private decryption key. In Estonia, this technology is used for electronic identity purposes (ID card, mobile ID, and digital ID).

X-Road unifies the access to all e-services and allows secure access to data in the distributed databases. Each institution is still responsible for the quality of the data and can determine which other institutions have access to its data. Additionally, X-Road does not limit how the registries and organisations implement their information systems, as all platforms and hosting models are supported, including cloud-based setups. In doing so, the **Adapter Server** is the key integration element which enables different applications to work together. It indicates the server which runs the service or database (e.g. the Population Registry), and it differs from database to database.

Some examples demonstrating the use of X-road are as follows:

- The citizen portal²⁹ acts as a **one-stop shop to government e-services** starting from various information queries and ending at submitting applications (such as applying for child

²⁹ <https://www.eesti.ee/est>

-
- benefits and municipal day care) and exchanging documents with government agencies.
 - Estonian **e-health system**³⁰ connects hospitals, clinics and other organisations to implement unified Electronic Health Record that supports health care by supplying medical practitioners with detailed information about patient's health all the while protecting their privacy.
 - The **e-prescription system**³¹ allows doctors to create prescriptions and make them immediately available to pharmacies. The patient can call the doctor and receive the medicines directly from the pharmacy without having to visit the doctor for a paper-based prescription.
 - The **E-File**³² is an information system that manages court proceedings of various types. The E-File system uses X-Road to connect business processes of court, police, public prosecutors, prisons, lawyers and ordinary citizens.
 - The **e-police system**³³ provides the police officers access to state registries such as the vehicle registry or document registry. For example, the police can use this system to check whether a suspiciously behaving vehicle is reported as stolen. Due to the extensive access and up-to-date information, Estonian citizens do not need to carry a driver's license or vehicle documents as such information is verified online directly from the source.

The source code of X-road is available on GitHub: <https://github.com/vrk-kpa/xroad-public>

³⁰ <http://www.e-tervis.ee/index.php/en/health-information-system>

³¹ <https://e-estonia.com/component/e-prescription/>

³² <http://www.rik.ee/en/e-file>

³³ <https://e-estonia.com/component/e-police/>

Cross-border Interoperability

The European Single Market drives the need for more cross-border exchange of data. Next, to initiatives at European level, the EU member states sometimes enter in close cross-border cooperation. Estonia is a member of EUCARIS³⁴, ECRIS³⁵ and is a partly connected member of EULIS³⁶. Furthermore, Estonia's e-Business Registry is connected to the European Business Registry (EBR), thus enabling access to official information regarding European companies.

In December 2013, the **Estonian and Finnish prime ministers concluded the Memorandum of Understanding** (MoU)³⁷ on cooperation regarding information and communication technology. It was digitally signed, and it is known as the first digitally signed international agreement between governments. Under the MoU, the concrete co-operation areas are defined as follows:

- Estonia's X-Road source code will be implemented for practical use in Finland as a national data exchange layer.
- Estonia and Finland will co-operate in the development of future versions of the X-Road platform and the Finnish national data exchange layer.
- Cross-border co-operation will be advanced in multiple fields of digital society, economy and government.
- The two countries will share information which is necessary to achieve the aforementioned objectives.

The **Nordic Institute for Interoperability Solutions** project will be an international development centre for the joint development of X-Road. As the first pilot service, the Estonian Tax and Customs Board has commenced cooperation with the Finnish Tax Administration to bring their cross-border data exchange to the X-Road channel.

³⁴ EUCARIS (European Car and Driving License Information System) <https://www.eucaris.net/>

³⁵ ECRIS (European Criminal Records Information System) http://ec.europa.eu/justice/criminal/european-e-justice/ecris/index_en.htm

³⁶ EULIS (European Land Information Service) <http://eulis.eu/>

³⁷ OECD, Public Governance Reviews Estonia and Finland: <http://vm.fi/documents/10623/307541/OECD+Public+Governance+Reviews+Estonia+and+Finland.pdf/3e816208-0d14-4ca4-9c1c-770ef76c307a>

E-Government Public Services making use of Base Registries data

The e-Estonia Portal³⁸ is used for information purpose and mostly directed for foreigners and international to share the knowledge of government e-services. It gathers all the main entry points to e-Government services available in Estonia. e-Estonia does not offer services itself, but rather it could be considered as portal which describes e-Estonia's digital society components.

In this sense, the most interesting section is the one dedicated to components which are *“the building blocks that power Estonia's integrated e-services. The modular nature of e-Estonia's flexible component systems means it is easy to add e-services in the future, allowing government systems to grow”*³⁹.

These building blocks are categorised by domains: Business, Citizens, Education, Financial-Services, Government, Health Care, Infrastructure, Public-Safety and Utilities. The following picture illustrates how the portal is organised.



Single-point of e-Government public services for citizens is the State Portal⁴⁰. It is administered jointly by public sector institutions and is meant for citizens, as it allows users to access and make use of a wide range of e-public services. Citizens and residents can access nearly all of their data online through the portal because 400 municipal and state services are already integrated. The citizens can log-in using their eID card or mobile ID and view all their data, as well as correct flawed information belonging to them. Having passed authentication, the citizen portal allows citizens:

- To use information systems and documents they need for their communication with the state.
- To manage citizen's data and use X-Road services.
- To use notification services, etc.

Finally, the e-Rik Portal⁴¹, under the Ministry of Justice, is mainly focused on the Business and Land Registries, offering services such as:

- Free-of-Charge reviewing of a company's B-card data, general data and tax data.
- Making queries by name, business registry code, location, the field of activities, etc.
- Viewing annual reports, personal and commercial pledge data, etc.
- Real-time monitoring of processing data and record amendments of companies.
- Visualise relations between various companies and persons, etc.

³⁸ <https://e-estonia.com>

³⁹ <https://e-estonia.com/components/>

⁴⁰ <https://www.eesti.ee/eng/services>

⁴¹ <http://www.rik.ee>

Or:

- Free-of-Charge viewing of land registry documents.
- Authorisation to another person to view documents.
- Paid viewing of land property data.

In both cases, there are a number of more advanced functionalities available, which are provided to users who have signed a contract and are paying the corresponding fee.

Best Practice

The Public Information Act requires that all public sector institutions keep a website. Local government institutions may organise the keeping of a joint website. However, the Act does not specify what *joint keeping* means. In the light of other legal provisions, it can be assumed that it is a joint technical platform, not a logical integrity. One institution can have several sites. In addition to the mandatory institutional site, institutions can also keep thematic and complementary cross-institutional joint sites. Several public sector sites are of national importance, such as, for example, the joint portal of public sector institutions meant for serving citizens: eesti.ee. Cross-institutional sites reuse the information resources of the participating institutions and refer to them, but usually contain their unique content.

From an interoperable point of view, websites are information systems rendering and handling online services (first of all information services). Websites are a part of the service room of the state information system. Services are registered in the service catalogue (RIHA). Front-end systems and back-end systems should be separated from each other in the state information system. Back-end systems are information systems of service providers. Front-end systems, which serve end-users, are portals of user organisations, information gateway <https://www.eesti.ee/eng> and other personalised portals of users.

Estonia also publishes recommendations based on its experience in e-Government (**Do's and Don'ts, based**)⁴²:

- Do – Create a decentralised, distributed system so that all existing components can be linked and new ones can be added, no matter what platform they use;
- Don't – Try to force everyone to use a centralised database or system, which won't meet their needs and will be seen as a burden rather than a benefit;
- Do – Be a smart purchaser, buying the most appropriate systems developed by the private sector;
- Don't – Waste millions contracting large, slow development projects that result in inflexible systems;
- Do – Find systems that are already working, allowing for faster implementation;
- Don't – Rely on pie-in-the-sky solutions that take the time to develop and may not work.

⁴² <https://e-estonia.com/the-story/how-we-got-there/>