Factsheet:

Access to Base Registries in Finland

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Finland towards Interoperability

In Finland, interoperability has been in the focus of the political world for over 15 years, with a first e-Government study in 2000 and guidelines towards building e-services in 2004. The Finnish Government and wider public sector have been early adopters of technology and have developed state-of-the-art information systems in accordance. Nevertheless, a main challenge has proven to be the co-ordination of these developments, which often occur in "silos", as well as their transformation into interoperable systems. In order to address these issues and improve interoperability in Finland, the **National Interoperability Framework**, which consists of legislation**,** strategic approach, structural arrangements, programmes and recommendations has been of great significance.

Throughout the years, multiple strategies have led to the formation of the Finnish **National Interoperability Framework,** which demonstrates an Enterprise Architecture approach to interoperability and in which Base Registries play a key role. In line with this, in 2011 Finland adopted the **Act on Information Management Governance**[1] in Public Administration, aiming for a common way of working when using and managing information. Accordingly, the Act encompasses the **Enterprise Architecture[2] (EA)** as a prerequisite for interoperability objectives of information systems as well as the method of adoption by the public sector. The **Enterprise Architecture** constitutes the main source of the Finnish Interoperability Framework and addresses matters such as Governance model, Business processes, Data definitions, Applications and Technology Architecture. Additionally, the **targeted Enterprise Architecture**[3] (in-progress) will be employed, utilising shared information platforms and shared e-Government platforms as well as e-Services, which will consequently lead to interoperable systems. A new law concerning the services produced in the National Architecture for Digital Services Programme came into force in July 2016. In the law these services (eID, e-authorizations, e-messages, data exchange layer etc.) have been made mandatory for public authorities. They are nationally financed. The law had e.g. made it mandatory for all public service producers to provide the metadata descriptions of their services into Finnish Service Catalogue, the national master repository of public service metadata descriptions. This catalogue is built in accordance with the Core Public Services Vocabulary (CPSV), the data model is compatible.

Strategic Approach

In continuation, the Public Sector ICT Strategy (2012-2020) has been the first common strategy for central and local government in Finland. Among a number of goals, it aims at the promotion of interoperability of public information systems, increasing availability of open public information as well as ensuring accessibility of electronic services to all citizens. The Strategy also sets out the basis for the Once-Only Principle by stating that citizens should only submit their information to the public authorities only once, nevertheless the OOP is not yet implemented in Finland. Furthermore, as one of the first results of the Strategy, in 2013 the Ministry of Employment and Economy drafted the report known as "21 paths to a frictionless Finland". Some of the paths included in the report pertain to building a uniform national service architecture, creating an open data ecosystem and improving digital services.

The report is still valid, however, the need for legally defining how the data is used has been detected: who and for what purpose. In order to overcome this interoperability challenge, the strategic approach is undergoing a process of renewal. This is principally occurring in the form of a legislation development geared towards harmonisation of information management legal provisions. This will focus on regulating the usage of data and should allow Finland to successfully implement the once only principle.

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[1] http://www.localfinland.fi/en/authorities/information-society/policy/Pages/Act-on-Information-Management-Governance-in-Public-Administration.aspx
[2] Enterprise Architecture, http://vm.fi/en/enterprise-architecture-in-practice
[3] Target Enterprise Architecture, http://vm.fi/en/target-architecture

Finland is among the countries that have a leading role in digitalisation and electronic administration. One of the key projects of the government is the digitalization of the public services[4]. The government has established the principles for the digitalisation of all public services. Also these principles highlight the interoperability, once-only principle and open data.

Important background work for interoperability has and will be done within a number of projects. An example of an ongoing project is the National Service Architecture Programme 2014-2017 (Kansallisen palveluarkkitehtuurin toteuttamisohjelma - KaPa). In this programme several shared services have been built for the public sector: e-Identification, Data exchange layer (in co-operation with Estonian X-road), e-Authorisations, new national portal Suomi.fi compiling the service views for citizens, enterprises and public officials, Finnish Service catalogue containing the metadata of public services, e-Messages, Maps and also e-Payments. These services are nationally financed and most of them can also be used by private organisations[5].

Examples of completed projects are eServices and eDemocracy Acceleration Programme 2009-2015, (SADe) and The Finnish Open Data Programme 2013-2015.With the aim of opening data and improving data accessibility for citizens and businesses, Finland implemented the Open Data Programme 2013-2015, led by the Ministry of Finance. The Programme has proven effective in eliminating obstacles to the re-use of public data and allowed for creating preconditions for open data within the public administration. One theme in the current government's strategic programme is digitalisation and the programme highlights the re-use of open data in business: The open data policy shall be put into action by ministries in their respective administrative branches, agencies and local authorities[6],[7]. The national portal for open data is managed and developed based on a decree by the Population Register Centre since 1.1.2017.

Structural Arrangements

Another important development in Finnish interoperability, and in particular for services' provision, is embodied in the form of a **common service provider**. The **Government ICT Centre Valtori**[8] is a service centre and Government agency under charge of the Ministry of Finance. The Centre provides sector-independent ICT services, i.e. services based on commonly available hardware and software solutions. Having such a common service provider has a number of benefits, such as unified IT infrastructure solutions and services which ensure the delivery of high quality services to citizens and businesses. Furthermore, the unified services enable effortless solutions' interoperability among central government organisations, while the unified infrastructure solutions allow central government organisations to focus on developing information systems specific to their own core functions instead of investing additional resources towards maintaining and developing the overall infrastructural solutions.

Recommendations

An important instrument to enhance interoperability have been the **JUHTA recommendations[9]** (up to 200), a set of principles and guidelines for the JHS[10,11] system for data management of state and municipal government. The recommendations are continuously updated by JUHTA within the Ministry of Finance. They are not legally binding, but can, however, be of great use when providing the entire public sector (at

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[4] http://valtioneuvosto.fi/en/implementation-of-the-government-programme

[5] http://vm.fi/en/national-architecture-for-digital-services

[6] https://valtioneuvosto.fi/documents/10184/1427398/Hallitusohjelma_27052015_final_EN.pdf/f1071fae-a933-4871-bb38-97bdfd324ee6

[7] *http://vm.fi/avoin-tieto?p_p_id=56_INSTANCE_SSKDNE5ODInk&p_p_lifecycle=0&p_p_state=normal&p_p_mode=view&p_p_col_id=column-2&p_p_col_count=1&_56_INSTANCE_SSKDNE5ODInk_languageId=en_US*

[8] http://www.valtori.fi/en-US/Information_about_Valtori

[9] JUHTA recommendations, https://www.paikkatietoikkuna.fi/web/en_old/jhs-recommendations

[10] http://www.jhs-suositukset.fi/web/guest/jhs

[11] http://www.jhs-suositukset.fi/web/guest/jhs/recommendations/189

municipal as well as national level) with a set of uniform instructions to define data and promote usage of standards in terms of ICT). The recommendations are continuously maintained by phasing out the obsolete ones and adding new when needed (E.g. about Geo data linked to INSPIRE).

> *"The JUHTA recommendations are meant to harmoniously guide the whole public administration in Finland".*

JHS Recommendations can be about unified procedure, data definitions or instructions for use in the public administration. JHS system's purpose is to improve the interoperability of information systems and their data, to create the conditions for administrative and sectorial boundaries to independent development activities, as well as more efficient exploitation of existing data. Thus, the recommendations are aimed at minimizing the duplication of development efforts, guiding the development of information systems and at achieving good and uniform practices in public administration and information management.

Main priorities of the JHS-system are the following:

1. Interoperability of information systems: services to support the necessary data transmission metadata, common interfaces and their management, data structures, codes and dictionaries, electronic services and administration
2. Use of common information resources: the promotion of the use of information once collected, reducing the duplication of records, interface development services
3. Transaction User Interfaces: Multi-channel, integrity and accessibility.
4. Processing of data related to information security and data protection: all the recommendations take into account their impact on data security and protection.
5. Support the development of services, good practice: dissemination of good practices locally, developed nationally.

Legal Interoperability

Basic Data and Information Resources are both the National Base Registers required by law and other key national-level information resources. In Finland, a National Base Register is a centralised information system in which key information about the basic units of society, such as people and property, is collected comprehensively and as accurately as possible. The maintenance of such Registers is required by law and the principal National Base Registers include the Population Register System (PRS), the Land Information System (LIS) and the Business Information System (BIS). Basic information resource is therefore a wider concept than national Base Register[12].

The following legal provisions pertain to the main National Base Registries in Finland:

- **The Act[13] on Population Information System and the Population Register Centre's Certificate (661/2009) defines the Population Information System** as a general nationwide computerised basic register, which contains the information of persons, real estate, buildings and apartments, as well as administrative and other similar regional divisions. Basic information related to the identification of people and buildings is registered in the Population Information System. Personal data recorded in the system includes name, personal identity code, address, citizenship and native language, family relations and date of birth and death (if applicable). Building data registered includes the building code, location, owner, area, facilities and network connections, intended use and year of construction. Real estate data registered includes the real estate unit identifier, owner's name and address, and buildings located on the property. Moreover, it consists of the automated data processing by means of the nationally as well as the regionally organised documents. The Population Information System[14] is maintained by the Population Register Centre and local register offices. Registration of information is based on statutory notifications made by private individuals and public authorities. The information in the system is used throughout Finnish society's information services and management, including in public administration, elections, taxation, judicial administration, research and statistics. Businesses and other private organisations can also gain access to the information.
- **Business Information System (BIS)** is defined by the Business Information Act[15] (244/2001; amendments up to 1491/2001 included) as a uniform information system, a free data service jointly maintained by the Finnish Patent and Registration Office (PRH) and the Tax Administration. It contains contact and identification information on businesses, maintained by means of automated data processing. In order to facilitate business identifications and activity, a code is given to businesses and organisations by the authorities as a Business ID (Business Identity Code) and replaces the Trade Register Number, Foundation Register Number and Business Code used before.
- The **Land Information System[16,17]** is divided into two parts, the cadastre and land register, which in turn consist of the title and mortgage register. The cadastre consists of information about the physical and legal formation of the plot of land. Information about property and other rights to the land are entered into the land register. The Land Information System´s cadastre is jointly maintained by the National Land Survey of Finland and local authorities. The objective of this Act is to organise a national information service concerning real estate and other units of land and water areas based

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[12] Page 8, http://vm.fi/documents/10623/360816/Open+data+goals+and+action+proposals+2015-2020/c7e9c09c-c492-4f04-ac52-2449b0c4973b
[13] The Act on Population Information System and the Population Register Centre Certificate Services, http://www.finlex.fi/fi/laki/ajantasa/2009/20090661
[14] Population Information System, http://vrk.fi/en/population-information-system
[15] Business Information Act, http://www.finlex.fi/en/laki/kaannokset/2001/en20010244.pdf
[16] http://www.finlex.fi/en/laki/kaannokset/2002/en20020453.pdf
[17] https://www.fig.net/resources/proceedings/fig_proceedings/fig2006/papers/ts20/ts20_02_tella_0734.pdf

on information technology. This service is implemented by means of a centralised Land Information System which is intended for public use. The Land Information System comprises data referred to in the Cadastre Register Act[18] (392/1995) and data entered into the land register, as well as other data as laid down in other legislation. According to the Act, the National Land Survey of Finland shall provide a free public access to the data included in the Land Information System. Extracts, certificates and other documents are subject to charge, or can be obtained through a technical user interface. Unless otherwise provided on special grounds, electronic copies of the data may be given subject to charge.

The most relevant legal constraint is Data protection, which is implemented through the Finnish Personal Data Act. The **Finnish Personal Data Act**[19] is based on the European directive on the protection of individuals with regard to the processing of personal data and on the free movement of such data (95/46/EC), also known as the personal data directive. The Act sets out principles for data handling procedures, controller obligations and the rights of the data subject. Furthermore, provisions relevant to the base registers are set out in special legislation. The Office of the Data Protection Ombudsman[20] is the body responsible for the supervision of all processing operations covered by the Personal Data Act.

Additionally, the **Constitutional Act[21,22]** (731/1999), the right to access information. Specifically in section 12 it is stated that everyone has the right to access public documents and recordings. It could be considered as the reason for maintaining Base Registers, as access to information is a Constitutional right in Finland.

In 2011, Finland adopted the **Act on Information Management Governance**[23] in Public Administration. The Act establishes provisions on information management governance in public administration aiming to improve their efficiency of activities by promoting and ensuring the interoperability. In section 3 of the Act, **interoperability of public administration** information systems is **defined as the technical and content-based interoperability between authorities in the public sector when the systems use the same data**. Furthermore, this legislation obliges all public administration organisations to define the as-is and target architecture in their own area.

Furthermore, Finland has demonstrated significant efforts towards opening and re-using public sector information through the **Act on the Openness of Government Activities[24]** (621/1999; amendments to 907/2015 included) which transposes 2003/98/EC Directive on the re-use of public sector information (PSI) and adds the terms and conditions on the re-usage of information. Section 9 of the Act, "Access to a document in the public domain" clearly states that: "Everyone has the right of access to an official document in the public domain". Accordingly, the Ministry of Finance is responsible for the processing and reforming the system for publishing public sector open data, and in September 2014 the Open Data Portal[25], was made available.

The Open Data Portal, Opendata.fi[26] or avoindata.fi is a service for sharing public administration's open data and it is targeted at all organisations wishing to utilise the data produced by public administration. In addition to the above, Opendata.fi is a one-stop portal that provides an overview of Finland's open data, as well as descriptions and guidelines for promoting interoperability. The service seeks to promote the

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[18] Cadastre Register Act http://www.finlex.fi/en/laki/kaannokset/2002/en20020453.pdf

[19] Document, but not the Act,
http://www.maanmittauslaitos.fi/sites/default/files/VRK_PERTIEVA_2011_GB.pdf

[20] http://www.tietosuoja.fi/en/

[21] http://www.finlex.fi/en/laki/kaannokset/1999/en19990731.pdf

[22] http://www.nordicom.gu.se/sites/default/files/publikationer-hela-pdf/access_to_information_in_the_nordic_countries_2014_0.pdf

[23] http://www.localfinland.fi/en/authorities/information-society/policy/Pages/Act-on-Information-Management-Governance-in-Public-Administration.aspx

[24] http://www.finlex.fi/en/laki/kaannokset/1999/en19990621.pdf

[25] Open Data Portal: www.avoindata.fi/fi

[26] Avoindata.fi – interoperability and open data service, http://vm.fi/en/opendata

availability, utilisation and use of open public data in a variety of applications. This is evident from the fact that Finnish public authorities have already published 1166 datasets, out of which 44 are datasets on the population information system, and approximately 200 are terrain datasets which are part of the land information system.

The increase of availability of open data has been made possible by the **Open Data Programme 2013-2015**[27],[28], which created the preconditions for open data within the Public Sector. The Open Data Programme was based on extensive cooperation between ministries, government agencies and institutions, local government, research institutes and developer communities. Programme outputs include an open data and interoperability portal, Avoindata.fi. So as to harmonise the terms of use, the public administration recommendation JHS 189 'Licence for use of open data' was prepared.

As a result, an **Open Data Guide**[29] was designed to give practical advice on opening data for Finnish public authorities, but it can be used by anyone who has an interest in open data. The guide sheds light on the process and the best practices for implementing open data. Besides text, the guide utilises different kinds of tools, e.g. pictures, tables, videos and online course materials as essential parts of the guide. There is also an option to add comments straight to the guide which gives anyone an opportunity to participate in improving and developing the guide further. The feedback will be incorporated in the future versions. The guide is published only in Finnish. Nevertheless, the content of open data guide has been expanded with internationally known best practices concerning open data and the process of opening public sector information. Best practices created by Share-PSI thematic network are based on the European Commission's Revised PSI Directive. Practices are aimed to support and harmonise the process of opening data in the public sector, and are defined at high-level to enable their implementation in actual national or local environments and designed to accelerate the enactment of the directive.

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[27] http://vm.fi/documents/10623/360816/Open+data+goals+and+action+proposals+2015-2020/c7e9c09c-c492-4f04-ac52-2449b0c4973b
[28] Open data utilization of innovative knowledge:
http://vm.fi/documents/10623/1107406/Avoimen+tiedon+ohjelman+loppuraportti/8eaaee68-6f3b-4a48-8b57-c5866315bf13?version=1.0
[29] https://www.avoindata.fi/fi/opas

Organisational Interoperability

In Finland, Base Registers are used to record data on entities defined as "basic units of society". The units correspond to the following: individuals or natural persons, businesses and other organisations or foundations, buildings, and finally dwellings/premises. Accordingly, the Base Registers are used to record the status of each basic unit or data subject, as well as any details which may have led to a change in the previously recorded status.

As depicted in the following table, the administration of the Base Registers is coordinated by a number of public bodies in Finland, whereby each Base Register handles its own respective Master Data Type:

Base Registry	Authority	Master Data
Population Information Registry[30]	Population Register Centre	PERSONAL DATA (NATURAL AND LEGAL PERSONS)
Land Information System	The National Land Survey of Finland is responsible for the establishment, administration, maintenance, information service and development of the Land Information System	LAND
Business Information System[31]	National Board of Patents and Registration of Finland and the Finnish Tax Administration	BUSINESS
Taxation Information System[32,33,34]	Tax Administration	TAX
Vehicle Registry (Vehicle Act[35,36])	Finnish Transport Safety Agency (Trafi)	VEHICLES

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[30] Population Information System, http://unstats.un.org/unsd/demographic/meetings/wshops/1995_Rabat_CRVS/Docs/Doc.24_Finland_eng.pdf

[31] BIS, https://tietopalvelu.ytj.fi/yrityshaku.aspx?kielikoodi=3

[32] Taxation Information System, https://www.vero.fi/fi-FI/Tietoa_Verohallinnosta/Julkisuus_ja_tietosuoja/Verohallinnon_rekisterit/Verotuksen_tietojarjestelma(13047)

[33] https://translate.googleusercontent.com/translate_c?depth=1&hl=en&prev=search&rurl=translate.google.be&sl=fi&u=https://www.vero.fi/fi-FI/Tietoa_Verohallinnosta/Julkisuus_ja_tietosuoja/Verohallinnon_rekisterit/Verohallinnon_rekisterit(12962)&usg=ALkJrhjyJz5wLq07om0GceztS3EDN6L9AA

[34] https://translate.googleusercontent.com/translate_c?depth=1&hl=en&prev=search&rurl=translate.google.be&sl=fi&u=https://www.vero.fi/fi-FI/Tietoa_Verohallinnosta/Julkisuus_ja_tietosuoja/Verohallinnon_rekisterit/Verotuksen_tietojarjestelma(13047)&usg=ALkJrhgPg49jTk8b-d3GCTx2hpX2sKxQzA

[35] Vehicle Act, http://www.finlex.fi/en/laki/kaannokset/2002/en20021090.pdf

[36] Government Decree on the registration of vehicles, http://www.finlex.fi/fi/laki/ajantasa/2007/20070893

Trade Registry[37]	Finnish Patent and Registration Office	TRADERS, ie companies and businesses

The governance of Base Registers in Finland is distributed as there is neither central governance approach nor body in charge of them. Accordingly, each register is quite independent, both in terms of authority and funding.

As an example of the unique approach for each Base Register, it can be pointed out that the National Land Survey of Finland collects data from municipalities, which is then merged with the data in the Land Registry. On the other hand, the Population Information Register's data is used in a large number of procedures and locations. Thus the Population Register manages its data exchange through agreements with each body requesting the information, including the municipalities. In this case, it is the municipality that receives updates on population changes from the Population Information Register on a daily basis.

There is a number of national base registers, maintained by the Population Register Centre and local register offices, National Land Survey of Finland, National Board of Patents and Registration of Finland, the Tax Administration and Statistics Finland, all of which form the core of the Finnish public sector data management infrastructure.

As mentioned before, the Public Administration's Enterprise Architecture, guides and aligns the architecture work in the sectors and the Ministry of Finance is responsible for developing and maintaining this top-level view. Furthermore, the Ministry of Finance is authorised to establish decrees concerning information architecture, information systems architecture and technical architecture. The Ministry also steers the development of information management in both central and local government, supported by the Act on Information Management Governance in the Public Sector. Thus, the task of the Ministry of Finance is the general steering of public sector agencies' information management in accordance with the Act. Each ministry steers the development of information management and of information management projects in its own field of activity.

Also under the Ministry of Finance, the Committee on Information Management in Public Administration, JUHTA, promotes cooperation in information management between the State and the municipalities, in which interoperability is the objective.

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[37] Trade Registry,
https://www.prh.fi/stc/attachments/rekisteri_ja_tietosuojaselosteet/rekisteriseloste_kaupparekisteri_EN.pdf

Semantic Interoperability

Semantic assets are a key mechanism to enable sharing of the meaning of the data and the appropriate and fast integration of information exchange between national systems. Thus, shared terminology, core vocabularies and common standards, both semantics and syntax, are prerequisites for semantic interoperability. It is precisely for this reason that the Finnish Government has embedded the common architecture definitions, such as architecture principles, common information architecture including common metadata and data services and common reference architectures, in the formation of Base Registries.

The Finnish **EA development guidelines**[38] for Information Systems facilitate semantic interoperability. Basically, the recommendation provides a unified design methodology, planning framework and a coherent description of the models and the development of the overall architecture of public administration organisations at different stages. The **Public Administration Recommendations**[39] (JHS recommendations) provide information management guidelines for public administration (both governmental and municipal). Recommendations for Development of ICT architecture include e.g. the following:

- **JHS 179 on Enterprise Architecture Development (2017):** The recommendation defines a method for planning enterprise architecture to an organisation and describes the recommendations for creating the descriptions of the different areas of the enterprise architecture.

- **JHS 170 XML Schemas (2009):** The recommendation describes the common principles of public administration XML schemas formation and builds on international standards where applicable and acknowledged reference recommendations (W3C XML Schema and ISO 11179-5).

- **JHS 158 of Geographic Metadata (2010):** The recommendation defines the vector and bitmap content of spatial metadata and provides guidance for describing geographic information and metadata to documents. The recommendation applies primarily to digital spatial data. It accounts for the impact of the INSPIRE Directive and Metadata Regulation.

The **National Architecture Repository**[40] contains enterprise architecture descriptions of public administration as well as a modelling service for organisations to use.

Up to the present, apart from the available datasets, the Open Data Portal[41] has been used to distribute also interoperability descriptions and instructions. The standards[42] and data models are UML and Unicode, while the data formats to represent Base Register information have mainly been html, xml, PDF, wms, wfs, pdf, doc, XLSX, PPTX. Open data Portal service source codes are available on GitHub[43]. **JHS metadata registry**[44] offers the common vocabulary of public administration (JHS glossary). The Register is produced by following the JHS170 and JHS175[45] recommendations. The tool, however, has come to the end of its lifecycle and a **new national metadata platform** is to be developed by the end of 2018 as one of the

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[38] Enterprise Architecture, https://www.avoindata.fi/fi/content/tietoa-kokonaisarkkitehtuurista
[39] JHS recommendations, http://www.jhs-suositukset.fi/web/guest/jhs/recommendations
[40] https://arkkitehtuuripankki.onqpr.com/QPR/Portal/QPR.Isapi.dll?QPRPORTAL&*prmav&SES=bwDX4ec ZeRasp205o4uIlw&FMT=p&LAN=fi%2c1&DTM=&RID=1019100405614346817
[41] Open Data Portal, https://www.avoindata.fi/data/fi/dataset?collection_type=Interoperability+Tools
[42] Standards, https://www.avoindata.fi/data/fi/dataset?vocab_content_type=standardit
[43] https://www.avoindata.fi/fi/content/lisenssit
[44] http://jhsmeta.fi/
[45] Development process of the terminology in the public administration, http://www.jhs-suositukset.fi/suomi/jhs175

government (2015-2018) key projects[46]. The platform will be part of the National Architecture for Digital Services[47] and form a national version of EU level development[48]. It will consist of four services and tools for both human and machine-readable resources and metadata: a tool for collaborate terminology maintenance, a tool for publishing terminologies, vocabularies and ontologies, a tool for collaborate and linked data modelling and a tool for reference data (code service). One of these services is already in use, known as Finto[49], which has its roots in its predecessor ONKI service and the FinnONTO project (2003-2012)[50]. The service enables browsing ontologies and offers also interfaces for integrating the thesauri and ontologies into other applications and systems. Behind the "one-stop-shop for semantic assets" platform development exists a vision of more formal information architecture for public administration, based on the ideas of e.g. linked data and a systematic use of shared terminologies as the source of semantics. Efforts are also put to more effective coordination of various initiatives working with semantic interoperability.

Last but not least, one of the most relevant resources fostering information interoperability in Finland is the **Service Data Repository data model**[51] which forms the basis for the Digital Service Catalogue (see also chapter *E-Government Public Services making use of Base Registries data*). It provides downloadable resources and connects services and service channels with topic categories as well as target groups and life events, so that the service data is not solely based on structures, but on situations and customers' needs.

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[46] Government Key Project: Joint metadata and information management 2016–2018, http://valtioneuvosto.fi/hanke?selectedProjectId=22426

[47] http://vm.fi/en/national-architecture-for-digital-services

[48] EIF Framework, https://ec.europa.eu/isa2/eif_en; Core Vocabularies, https://joinup.ec.europa.eu/community/semic/og_page/core-vocabularies

[49] Finnish Thesaurus and Ontology Service, http://finto.fi/en/

[50] http://seco.cs.aalto.fi/projects/finnonto/

[51] http://esuomi.fi/palveluntarjoajille/palvelutietovaranto/ptvn-ladattava-aineisto/?mdocs-cat=mdocs-cat-11&att=Suomi.fi-palvelutietovaranto

Technical Interoperability

Part of the **National Service Architecture** (2014-2017)[52], has been the development of a **National Service Bus**[53]. **Palveluväylä**[54] or **National Service Bus**[55], the Finnish version of X-road and Finnish data exchange layer (Kansallinen palveluväylä). This is part of a bigger entity that is called the **National Architecture for Digital Services** (Kansallinen palveluarkkitehtuuri). An enterprise service bus[56] (ESB) is a software architecture for middleware that provides fundamental services for more complex architectures.

The Service Bus acts as the Data Integration Platform and the Ministry of Finance is the body responsible for this IT component. It is a technical and organisational environment that allows organising secure web-based data exchange between the information systems of the state. It allows people, institutions and enterprises to securely exchange data and organise the access of people to the data preserved and processed in state databases.

Implemented in close co-operation with **Estonia**, the layer is based on the concept and principles of **the X-Road solution**[57]. The data exchange layer is modelled on a standardised inter-organisational information transmission utilising open interfaces and an open source code. It is a platform independent data exchange layer between different databases and information systems. **Platform independence is achieved by using standardised SOAP protocol.**

Examples of the services in the Service Bus are:

- Suom.fi[58], the **Citizens portal** which functions as a single entry point, providing access to various queries on the services being provided
- **e-Health system** providing self-conducted health checks online. This is part of the virtual clinic model, in which people's own medical data can be linked to new types of service models and the healthcare system. Easy access to treatment as well as time efficiency are the most visible outcomes.
- The service architecture also includes creating a new national **e-identification scheme**, for the verification of citizens' electronic identity by the state. Suomi.fi e-Identification enables the citizens of Finland and the European Union to be recognised in a safe way by using various identification media such as bank-id and mobile certificates. The identification service environment is meant for the use of governmental authorities, agencies and institutions, courts of law and other judicial bodies. The right to use the service has been described in law (the law on common administrative e-service support services).
- Nowadays, **digital authorisations** enable acting on behalf of another person or company. A person or a company authorises another person to act on their behalf. The service provider provides in its service or system a query that can be sent to Suomi.fi Digital Authorisations which then sends back the user's roles and authorisations to be accessed by said service. An authorisation based on an electronic power of attorney is saved in the National Register of Authorisations.
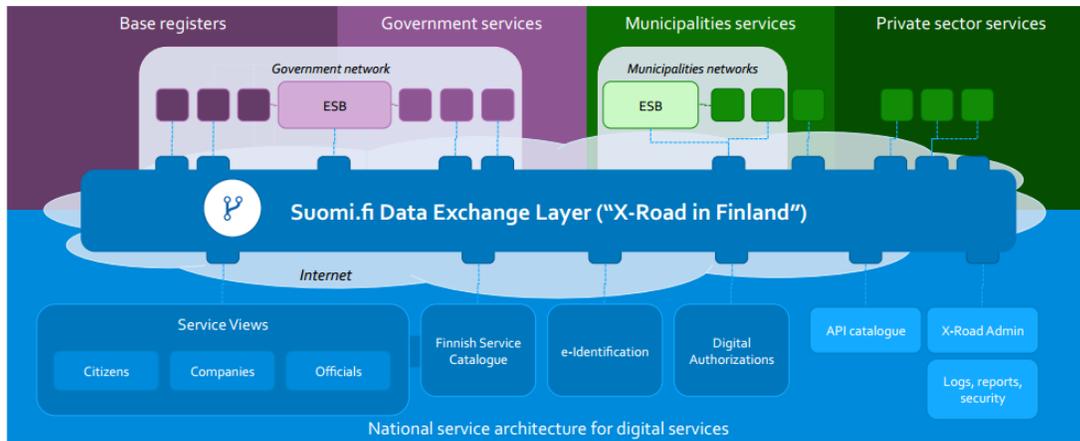
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[52] National Service Architecture, http://vm.fi/en/national-architecture-for-digital-services
[53] National Service Bus, https://confluence.csc.fi/pages/viewpage.action?pageId=50873043
[54] National Service Bus: http://vm.fi/palveluvayla
[55] https://esuomi.fi/palveluntarjoajille/palveluvayla/tekninen-aineisto/
[56] http://searchsoa.techtarget.com/definition/enterprise-service-bus
[57] X-Road, https://confluence.csc.fi/pages/viewpage.action?pageId=50873043
[58] Citizens Portal, One-Stop-Shop, http://www.suomi.fi/suomifi/suomi/valtio_ja_kunnat/index.html

Suomi.fi Data Exchange Layer ("X-Road in Finland")

On the other hand, the Finnish X-Road community has created the REST gateway[59] that supports version 4 of the X-Road message exchange protocol. This repository will be the home for REST/JSON support solutions in X-Road. The mandate for joint development is based on **MoU** (Memorandum of Understanding) which is developed and shared between Estonia and Finland. In this repository there is Proof of Concept level code for service that will enable REST support in X-Road version 6. The solution will not be part of Security Server, but more like a "REST Proxy". There is custom implementation for each system and no off-to-shelf components are available.

Finland is using as many components as possible from X-Road, in order to facilitate coordination for when the Estonian X-Road infrastructure becomes part of the national data exchange layer in Finland.

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[59] REST Gateway, https://github.com/educloudalliance/xroad-rest-gateway

Cross-border Interoperability

For Finland, the most significant **cross-border information exchanges**[60] are based on **bilateral exchanges or exchanges** between the **Nordic countries** (Sweden, Norway and Denmark). These services have been developed based on the information needs of the parties and their processes. Information exchange services between the Nordic countries have a long history and, for example, the Population Register Centre's Nordic Moving service has been systematically developed over the years (Nordic Moving = means exchange of population register information of people moving between the Nordic countries). Via the service, the basic personal information of a person moving from one Nordic country to another is transferred automatically to the Nordic countries' population registration authorities. The life and change of circumstance information of pension recipients is also transferred between the Nordic countries' pension institutions.

In addition, as part of the EU's epSOS[61] (European Patients Smart Open Services) project, in 2014 Finland and Sweden piloted the eResepti[62] service, by which, through contact points between the two countries, electronic prescriptions issued to a person in the country of residence are transmitted for delivery to pharmacies in the recipient country and delivery information returned to the country of residence. Moreover, with Estonia, in addition to death information[63], taxation information can be exchanged through the EU's Common Communication Network[64] (CCN) as well as information for pension and insurance case handling via a secure email link between the Finnish Centre for Pensions[65] (ETK) and the Estonian National Social Insurance Board[66] (ENSIB). In addition, basic information about all citizens of the country who are entered in the population register are exchanged between Finland's Population Register Centre and Estonia's Ministry of the Interior.

Furthermore, the **Memorandum of Understanding**[67] engages **Estonian** and **Finnish** governments into co-operation, with specific defined areas:

1. Estonia's X-Road's source code will be implemented for practical use in Finland as a national data exchange layer.
2. Finland and Estonia will cooperate in the development of future versions of the XRoad platform and the Finnish national data exchange layer.
3. Cross-border cooperation will be advanced in multiple fields of digital society, economy and government.
4. The Participants will share with each other information that is relevant to achieving the aforementioned objectives

In addition to the above, the Estonian Tax and Customs Board have commenced cooperation with the Finnish Tax Administration with the aim of bringing their cross-border data exchange to the X-Road channel.

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[60] vm.fi/dms-portlet/document/0/426868

[61] EpSOS, http://www.epsos.eu/?id=14

[62] Electronic Prescriptions, http://www.kanta.fi/eresepti-esittely

[63] Under the Vienna Convention on Consular Regulations, signed in 1963 article 37, deaths abroad should be notified to the individuals' home country, http://legal.un.org/ilc/texts/instruments/english/conventions/9_2_1963.pdf

[64] CCN, http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetail&groupID=3262

[65] Finnish Centre for pensions, http://www.etk.fi/en/the-pension-system-2/the-pension-system/administration-and-supervision/parties-to-pension-scheme/finnish-centre-for-pensions/

[66] http://www.sotsiaalkindlustusamet.ee/?lang=en

[67] https://www.riigikantselei.ee/valitsus/valitsus/et/uudised/Failid/2013/ICT_MoU_FI-EE_10dec2013.pdf

Finland has also been a major participant in EU initiatives that boost cross border co-operation. These joint collaborations between Member States include EUCARIS[68], ECRIS[69] and partial connection to EULIS[70]. Additionally, The Finnish Patent and Registration Office (PRH), which maintains the Trade Register, is the EBR member for Finland.

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[68] EUCARIS (European Car and Driving License Information System), https://www.eucaris.net/countries/finland/
[69] ECRIS (European Criminal Records Information System), https://e-justice.europa.eu/content_criminal_records-95-en.do
[70] EULIS (European Land Information System), http://eulis.eu/service/countries-profile/finland/

E-Government Public Services making use of Base Registries data

Suomi.fi[71] is the single access point to public services in Finland. The service information, e-services and forms in Suomi.fi have been collected under 14 topics. Suomi.fi portal does not offer services itself but rather connects citizens with the right authority in a structured and user friendly environment. The portal does not require any credentials to be used. By 2017 a renewed version of the portal will be available to improve shared use of information and the compatibility of information systems.

The **beta.suomi.fi**[72] new portal, the one-stop-shop service for public administration is gradually integrating all the public services aimed at citizens, businesses and public authorities. The portal is role-based as one can use the portal as either citizen or entrepreneur. Thus, the portal is integrating information with respect to **citizens, businesses and authorities**. The aim is to replace the three existing portals with a single one by 2017: Suomi.fi portal, intended for citizens, the Enterprise Finland service portal[73] for businesses and the Workspace site of the Suomi.fi portal that aggregates services for authorities. Throughout this reform process, the current services will be available as usual.

In the future, once logged-in as a user, citizens will be able to view their records considered as personal data. **Service Views** [74] offers public administration customers access to services, own information and digital messages easily in one place. Additionally, Service Views also provides intelligent guides for different life events, and information about services related to them.

The development version of Service Views for companies contains information and services for businesses and people establishing a business. The contents of the guides for business operations are unchanged from those in the current Enterprise Finland, but development of the guidelines is continuing and the contents will be revised on the basis of **feedback** from users. All national enterprise services presently included in Enterprise Finland are accessible through the Service Views for companies.

In autumn 2016, a section for identified users will be introduced in the beta version, for viewing the register data of the companies you represent. Nevertheless, development of the Suomi.fi e-service portals will continue until the end of 2017. By that point, the web service will include the possibility of electronic messaging with the authorities, along with the possibility to authorise another person to use the services on your behalf and use the e-services of various organisations by logging in with one user ID.

The citizen can log in by selecting one of the below illustrated methods.

The service provider connects its service according to the e-Identification service instructions, and chooses the suitable identification media for the service. When the end user tries to use a connected service, they

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[72] eSuomi.fi, https://esuomi.fi/palveluntarjoajille/
[72] Beta.suomi.fi: https://beta.suomi.fi/kansalaiselle/
[73] EnterpriseFinland portal: https://www.yrityssuomi.fi/en/
[74] Service Views, https://esuomi.fi/suomi-fi-services/suomi-fi-service-views/?lang=en

are asked to verify their identity with the method of their choosing. After a successful identification, the service can be used seamlessly, and other services using the Suomi.fi e-Identification can be accessed without separate sign-ons. Furthermore, the right to use the service has been described in the law on common administrative e-service support services[75]:

- Safe and easy, and the user can smoothly move from one service to the next without separate sign-ons;
- Use of X-Road services;
- Suomi.fi messaging takes care of delivering the messages to the users in the user's preferred channel. (Suomi.fi Messaging will replace the current Citizen's Account[76].
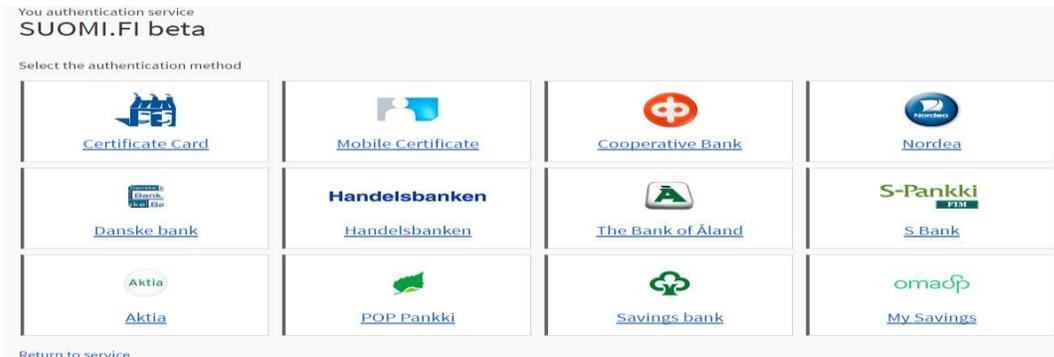
Additionally, Finland offers a **Digital Service Catalogue[77],** which can be equated to the tailored service information consisting of structured and harmonised service channel descriptions. Suomi.fi Finnish Service Catalogue is a concentrated data repository where organisations that either have the obligation or right to use it, provide information on the services and service channels they, offer as well as information on the organisation connected to the service. It makes data easily accessible and enables producing service data from the same place as a part of the normal service delivery. The Finnish Service Catalogue's basic principle is "service information as modular data".

The basis for the Finnish Service Catalogue data model is the **JHS 183 recommendation**[78]. In the future, JHS 183 will be updated to correspond with the Finnish Service Catalogue data structure. The data in the Finnish Service Catalogue is completely public and technically open data, which can be used for different purposes in administration as well as the private sector. The first to present the Finnish Service Catalogue data is Suomi.fi Service Views that have the following public development versions:

- For citizens[79];
- For businesses[80];
- For authorities[81].

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[75] Law on common administrative e-service support:
https://www.eduskunta.fi/FI/vaski/KasittelytiedotValtiopaivaasia/Sivut/HE_59+2016.aspx
[76] Citizen's account: https://asiointitili.suomi.fi/
[77] https://esuomi.fi/suomi-fi-services/suomi-fi-finnish-service-catalogue/?lang=en
[78] JHS 183 recommendation, http://www.jhs-suositukset.fi/web/guest/jhs/recommendations/183
[79] beta.suomi.fi