



Ecosystem of Digital Government for Improvement of Interaction between State and Society

Final Expert Report

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1 Introduction

This is the report prepared by the External Expert for the project “Ecosistema de Governo Digital para Melhoria da Interação entre Estado e Sociedade”.

The idea behind this survey is to study the international experience and present results and recommendations to be taken into account in the future design and implementation of the Brazilian digital public service portal, servicos.gov.br.

As the portal servicos.gov.br portal has all its content in Portuguese, it was not possible to analyze the site due to the language barrier. Nevertheless, the recommendations from this survey can be checked with local experts to identify practical actions to be taken to improve the Brazilian portal. More particularly recommendations presented in parts 2.4.3, 4.5, 5.3, 6.5 of this survey are very relevant and should be considered.

More specifically the report analysis and presents recommendations in the following areas:

- Best practices of national service portals, focused on the citizens’ life cycle and their experiences.
- Best practices that leaders in eParticipation have in common and which enable better access, retention and citizen participation.
- Best technologies used in service platforms that make the user experience easier to use, considering language, interface, information architecture, layout proposals, communication and push mechanism, service evaluation, usability, as well as interinstitutional services.
- Requirements for application that presents notifications and communication with users.
- Tools to monitor users’ behavior on the portal, such as google analytics, heat maps and how they can be used on digital public service platforms.
- European Union data governance, with emphasis on data sharing and reuse aspects used to provide services.

In total 112 recommendations have been drafted and proposed for all the above areas. Their summary can be found in part 8 “Overview of Recommendations”, while detailed discussion appears in the relevant parts of the survey.

2 National service portals

Survey of at least five best practices of national service portals, focused on the citizens' life cycle and their experiences

2.1 Introduction

In this part of the study, we identify best practices of national service portals, focusing on the organisation of services around citizens' lifecycle and the overall organisation of content. The goal here is to identify patterns of organisation of content for service portals, as good practices to be taken into consideration and tailored in the Brazilian context.

Additional aspects related to the users' experience (e.g. notifications) are discussed in different parts of the study e.g. in chapters 4 and 5.

2.2 Top service portals and approach to identify good practices

Five national service portals have been identified as "*best practices*" mainly from the perspective of the organisation of services around life events. These portals are chosen from the top ranked countries in the 2016 UN Survey using the Online Service Index¹. The top 20 countries in this index appear on the table below.

Table 1: Top countries in online Service Index, UN Survey 2016

Country	Online Service Index OSI
United Kingdom of Great Britain and Northern Ireland	1
Australia	0.9783
Singapore	0.9710
Canada	0.9565
Republic of Korea	0.9420
Finland	0.9420
New Zealand	0.9420
France	0.9420
Netherlands	0.9275
United States of America	0.9275
Austria	0.9130
Spain	0.9130
Estonia	0.8913
United Arab Emirates	0.8913
Sweden	0.8768
Japan	0.8768
Italy	0.8696
Israel	0.8623
Slovenia	0.8478
Mexico	0.8478

¹ The report is based on the 2016 UN Survey as this was available at the time the survey started.

After analyzing the service portals on this list, the five portals in Figure 1 were chosen. We present also the URL links to their national digital services portals.

The selection of these countries/ portals was based:

- a) on the highest possible rank in the top-20 list
- b) the availability of information in English
- c) the existence of dedicated service portals that follow, at least to some extent, the organisation of content around citizens' life-events or companies' business episodes.

1. UK: <https://www.gov.uk/>
2. Australia: <https://www.australia.gov.au/>
3. Canada: <https://www.canada.ca/en/services.html>
4. Finland: <https://www.suomi.fi/frontpage/>
5. Estonia: <https://www.eesti.ee/en/>

Figure 1: List of portals to be included in the analysis

For the five identified portals we perform the following analysis:

- a) Assess the organisation of content for describing the services and providing functionalities to the users to help them navigate the portal, identify interrelated services (service bundles), understand the purpose of service bundles and the overall organisation of information. The main organisation of service bundles of these five plus three additional portals from the list appear in Appendix I.
- b) Identify good practices.
- c) Compare, summarise and group the recent trends of the top service portal leaders to identify a set of recommendations that could be used for the Brazilian portal.

2.3 Identified good practices

In this part, good practices per country/portal are identified and discussed. To avoid unnecessary repetition, good practices identified in one country are not repeated if we find them elsewhere.

2.3.1 UK

The UK eGovernment portal² has received very positive comments from professionals and scholars all over the world for the simplicity of its design, the clarity of its content and for the fact that it consolidates hundreds of governmental websites in a single point.

The main message at the first page of the portal is "Welcome to GOV.UK. The best place to find government services and information. Simpler, clearer, faster".

We present below a selection of good practices identified in the portal:

- **Centralization of information about eservices in one place**
In the UK, there was a large re-organisation effort of service portals characterized by centralization of all information about 25 ministries and 391 agencies and public bodies in one place. The portal contains information not only about the available digital services but also the structure, function and organisation of the British government.

² <https://www.gov.uk/>

- **The UK portal is a “deep” portal**, in the sense that it presents and manages a big volume of information in its own, single domain (gov.uk). Providing such a single point of reference is considered important, as citizens and businesses do not need to browse and search multiple web portals and sites. More discussion on “deep” portals can be found on the findings part below.
- **Government structure and information about ministries and agencies**
A full list of the overall public sector together with the supervised organisations is available via the portal³. All ministries are presented using a common template. The common presentation approach, the common organisation of information and the specific content included is considered best practice for presenting the government structure. Other good practices in this respect include the following:
 - Under the “*Corporate Information*” section there is interesting information for each individual public agency e.g. data for energy consumption, transparency data kai complaints procedure, consultations⁴.
 - Clear information for officials, political and administrative personnel with CVs and clear information on mandate and responsibilities is provided per position⁵.
 - Easy access for citizens to make a Freedom of Information (FOI) request for each ministry, contact information, important documents, news, etc.
- **Promoting participation**
 - A separate section exists inside the general web portal for **eParticipation** called “Get Involved”⁶, where citizens can find consultations and petitions to be informed or to participate.
 - This part has two sub-parts: a) how to **engage with government** via participating in consultations, b) how to **take part** in activities close to you.
 - Citizens can start in the portal their own petitions “...to influence government and Parliament. If the petition gets at least 100,000 online signatures, it will be considered for debate in the House of Commons.”
 - There exists an interest section called “Take Part”, where opportunities for engagement and civil participation in important initiatives are high-lighted and advertised in a visually attractive way, to increase citizens’ interest and participation from organizing street parties to help make neighborhoods safer.
- **Common functionalities used across the portal pages**
 - Use of “**Follow us**” option in all ministries. The user can be connected with the following social media by just pressing a button: Facebook, Twitter, Flickr, YouTube, official Blogs.
 - **Feedback mechanism per page** that includes the following options available to be used: “Is this page useful? Yes this page is useful/No this page is not useful” and “Is there anything wrong with this page?”
 - Possibility for **interactively browsing available graphs and statistics**⁷. This allows the users to find the information they look for in a very user-friendly and intuitive way.
 - **Explicit licensing for all pages and information**: As appears in the portal: “*OGL: All content is available under the Open Government Licence v3.0, except where otherwise stated*”. This open licence allows users to copy, publish, distribute, transmit, adapt and exploit commercially and non-commercially all portal data and information with the only obligation to acknowledge the source.
 - **Mobile-friendly design** for all portal pages.
 - In all pages there are additional links as “**Related content**”⁸. This is particularly useful, as the citizen can find related information and better understand the context of a service, but also identify other related services which perhaps would make a mean-

3 <https://www.gov.uk/government/organisations>

4 See for example <https://www.gov.uk/government/organisations/department-for-education>

5 For example: <https://www.gov.uk/government/people/helen-judge>

6 <https://www.gov.uk/government/get-involved>

7 7e.g. <https://www.gov.uk/performance/govwifi>

8 Example: <https://www.gov.uk/carers-allowance>

ingful bundle for her/his situation. In general, enhancing the information for one service with this type of contextual information or interrelated services is considered a good practice.

- **Very clear privacy and use policy** with clear Privacy notice⁹, clear explanation of how cookies are used by the owners of the portal¹⁰ and the general Terms and Conditions of the portal¹¹.
- **Organisation of information about services:**
 - **Three-layer hierarchical organisation** of service presentation. An example can be seen in Figure 2 below. This organisation offers a very comprehensive and intuitive way for users to browse, search and discover the service(s) they need. The visual implementation is also very intuitive, as citizens can always check the upper levels and they are not getting lost in the maze of services available through the portal. The specific organisation and presentation is considered **best practice**.
 - The bundling of services is based on a **hybrid approach of life-events** (e.g. “Employing people”) and **topic areas** (e.g. “Environment and countryside”).
 - The portal does not only provide information on how someone can execute the service but also **background information** e.g. under the service “*Funding for postgraduate study*” there is guidance on how someone can apply for government money for a loan for master studies but in addition to this there is also a list of NGOs, charities and trusts that could support the student.

The portal features for each service a “Related Content” section where citizens can better understand the context and policies around the service.

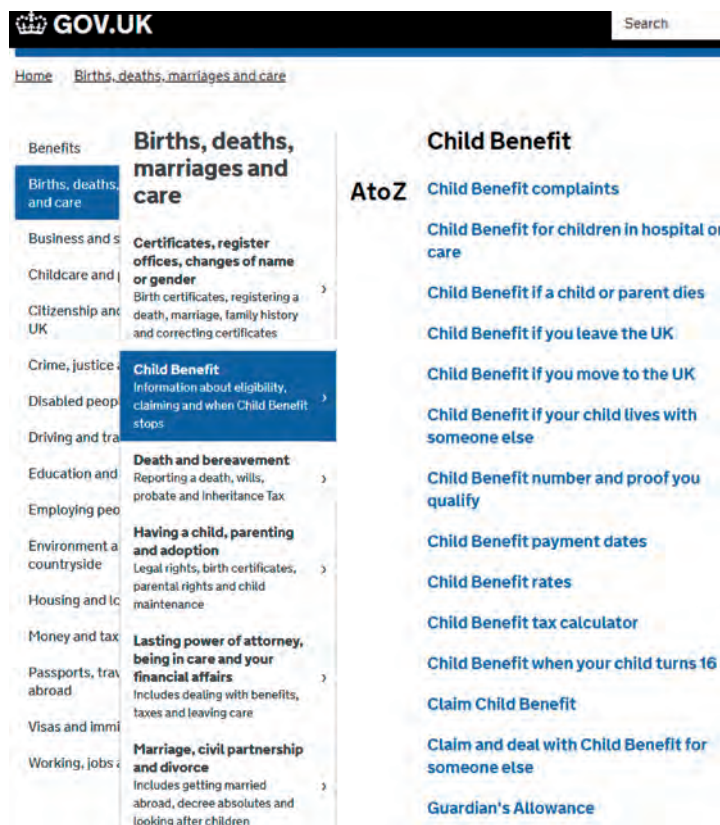


Figure 2: Three level organisation of services in the UK service portal

9 <https://www.gov.uk/help/privacy-policy>

10 <https://www.gov.uk/help/cookies>

11 <https://www.gov.uk/help/terms-conditions>

- **Monitoring of service execution and performance data**
 The portal makes available an impressive monitoring dashboard for service execution data (e.g. number of transactions) and performance data (e.g. user satisfaction) with 781 service dashboards, and 17 additional important horizontal services dashboards¹².
 - Performance monitoring includes per service very interesting indicators including the following: **Total volume of transactions, Total service cost and Cost per transaction, User satisfaction, Completion rate, distribution via different channels** through which the service is available, **Digital take-up**.
 - Information is provided using not only detailed tables with all the data, but also **interactive graphs** where the user can easily identify general trends, check for specific data, etc. See an example in Figure 3.
 - Availability of **bulk data** ready for download for service transaction volume, cost, users' satisfaction. The initial format for the downloads has been the **CSV format**, but after mid-August 2018, it seems that all performance data are available for download in **JSON format**.
 - There is a dedicated section¹³ where **detailed documentation and guidance for public agencies that want to provide performance data** is provided. This includes how to get a dashboard, how to create an API for providing data to the dashboard, etc.

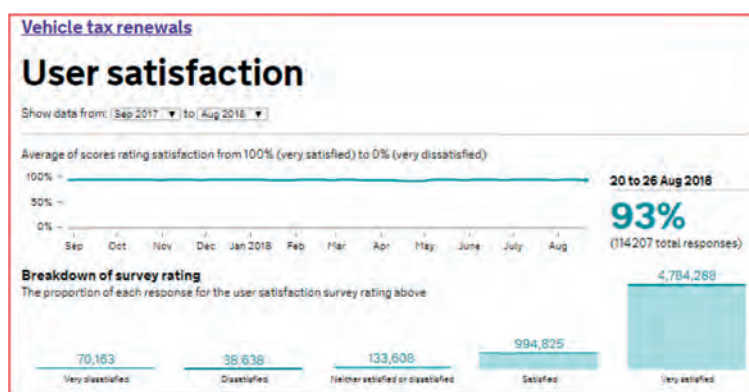


Figure 3: Example of performance monitoring for the service “Vehicle tax renewals”

2.3.2 Australia

Australia is placed on the 2nd position in the Online Service Index in the UN surveys in 2016 and 2018. The main message at the first page of the portal is *“Helping you find government information and services”*.

Unlike the UK portal, the Australian portal¹⁴ is designed more as a kind of a yellow page (catalogue) infrastructure which provides links to other external websites which are maintained by each separate ministry. The **Australian portal is a “shallow” portal**, in the sense that it basically provides links to other websites and locations and does not store primary information e.g. about services in its own domain but redirects users to other websites maintained independently by public authorities.

The result is that the presentation of services and information is **not as consistent and homogenized** as in the case of the UK portal. The Australian portal provides just a thin layer on top of hundreds of other governmental portals to support the user to find the right place where the actual service or information resides. It also provides some general-purpose information about the country¹⁵.

12 e.g. Gov WiFi and GCloud at <https://www.gov.uk/performance>.
 13 <https://performance-platform.readthedocs.io/en/latest/index.html>
 14 <https://www.australia.gov.au/>
 15 <https://www.australia.gov.au/about-australia>

The organisation of content at the first level (see appendix) reflects to a great extent the structure of the government. When a first level area is chosen, the user is confronted with a diverged set of links, many of them pointing to the websites of several organisations and ministries, others providing more detailed information and documentation about the service, etc.

Moreover, each department and agency uses its own content organisation and presentation style. The technical platforms upon which the portals are implemented also seem to be different. See for example, the portals of the Departments of Human Services¹⁶, Home Affairs¹⁷ and Health¹⁸. These are separate portals themselves with completely different look-and-feel, different organisation of content and services, etc.

Overall, it is much more difficult to find information and services you are looking for, if compared with the UK portal.

Below, we list a selection of good practices identified in Australian governmental eservice portals, not necessarily at the central one.

- **Common functionalities used across pages**
Per page, users have the possibility to
 - @ <https://www.australia.gov.au>: users have access to a list of **popular links** at the left side of each page.
 - @ <https://www.business.gov.au/contact-us>: **Users can ask questions and chat via a Web chat application** which is available 8am - 8pm Monday to Friday nationally. Web chat allows users to chat online to an agent for help with government grants, programs and services, help with the government’s online Business Registration Service, advice and information with starting, running or growing businesses, including small business and independent contractors. A feedback form is also provided for users to assess the quality of the portal (see Figure 4).
 - At the same portal, there is an interesting **multilingual support** which most probably comes from an integrated translation web service¹⁹. Through this, the content of the portal is available in 25 different languages.
 - @<https://www.humanservices.gov.au>: Using an **audio assistant service**, users have the possibility to listen what is included in the whole page or parts of the text via an audio assistant application which is embedded to the portal. The audio assistant service provides audio of high quality.

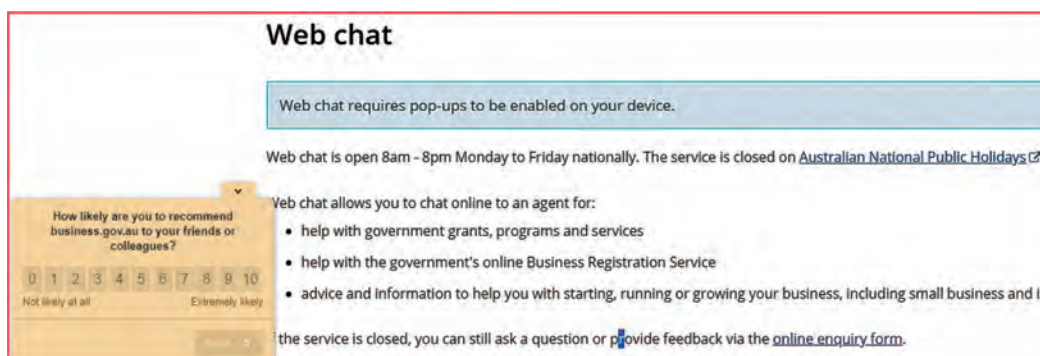


Figure 4: Web chat facility and evaluation form

16 <https://www.humanservices.gov.au/>
 17 <https://www.homeaffairs.gov.au/>
 18 <http://www.health.gov.au/>
 19 <https://www.business.gov.au/about/other-languages>

- **Personalised services:** There is the myGov portal²⁰ which provides **personalised access** to registered users to some (but not all) electronic public services. There is also another personalised service for registered users for the Department of Human Services²¹. End August 2018, an announcement appeared on this site that users need to use their myGov credentials to sign in. Although it was not possible to evaluate the overall functionalities of this part as this service is addressed to Australian citizens or inhabitants, it seems a powerful service platform with interesting characteristics. Some of them include:
 - Separation of “Services” versus “Payments” where citizens easily discover either rights or payment obligations²².
 - Possibility to identify, in a proactive way, relevant services/payments based on the profile of the citizen. A well-implemented **dialogue service** is offered to build the profile of the user. After answering a set of questions about her/his profile, the user can be recommended certain services or find payments due. This appears to be a successful implementation case of “radical personalization” for public service provision, similar to what is applied in other areas e.g. eCommerce, eBanking.
 - The platform allows full electronic payment service for all types of governmental payments.
- **Social media and apps**
 - A comprehensive **list with all governmental apps** is available²³, coupled with a search engine to look for apps by agency or keyword.
 - A list of all **official social media accounts** maintained by governmental agencies is available²⁴. The list is available to be downloaded as a CSV file, where in total over 800 governmental accounts in facebook, youtube, linkedin, twitter, etc are documented.
- **Central site for consultations**
As part of the national portal, there are two portals where public consultations are organised^{25 26}. The first is somehow hidden below the “News and Social Media” tab on the first page. The second portal is at a separate website and focuses on consultations related to the business area.
- **Central point of all government media release**
In one single page, all media releases published by ministers, departments or agencies can be found²⁷. Users can also subscribe on certain types of media releases e.g. money and tax, public safety, health, immigration and Visas, etc.
- **Central point of “How Government works”**
There is a section “How Government works”²⁸ where users can find comprehensive information about the machinery and system of government in Australia.

2.3.3 Canada

The Canadian service portal²⁹ is part of a national portal³⁰ with broader coverage. In the service portal part, a lot of information and services from all governmental bodies is presented in a consistent and harmonised way. The Canadian portal resembles more the UK **deep portal** structure than the Australian portal.

20 <https://my.gov.au/LoginServices/main/login?execution=e2s1>

21 <https://www.centrelink.gov.au/>

22 https://www.centrelink.gov.au/custsite_pfe/pytmfinderest/paymentFinderEstimatorPage.jsf?wecappid=pytmfinderest&wec-locale=en_US#stay

23 <https://www.australia.gov.au/news-and-social-media/apps>

24 <https://www.australia.gov.au/news-and-social-media/social-media>

25 <https://www.australia.gov.au/news-and-social-media/public-consultations>

26 <https://consultation.business.gov.au/consultation/Default.aspx>

27 <https://www.australia.gov.au/news-and-social-media/media-releases>

28 <https://www.australia.gov.au/about-government/how-government-works>

29 <https://www.canada.ca/en/services.html>

30 <https://www.canada.ca/en.html>

The initial organisation of content follows the main government functions (see Appendix). An interesting addition in the first page where all services are presented is a section called “Focus on”, where information about services is provided for three specific target group of citizens: Indigenous people, Veterans and Youth.

- As already mentioned, at the second level, all pages are structured based on a common template. Some good practices identified:
 - All pages include the “*Date modified*” field which is very helpful information for the users. There is also a “**Report a problem or mistake on this page**” button which provides a list of possible problems to select from. Last a “**Share this page**” button activates an application that allows the user to share the page using one of a long list of alternatives channels e.g. linkedin, email, facebook, twitter, etc.
 - In each page, there is a “*Features*” section which focuses on important background and context material for each thematic area³¹.
 - In the portal, there is systematic and extended use of **explanatory and helpful videos**, coupled with banners with 3-4 videos per type of service. All these videos are published on YouTube, while there is a follow button for the YouTube official account.
- The portal is **bilingual** i.e. supporting English and French.
- There are several **online accounts** that a Canadian citizen can acquire. The portal provides a list of 12 types of accounts someone could have³². “My Service Canada” account seems to be the more horizontal providing access to several social services, but still there is not one single account for citizens to access all governmental electronic services. Although the large number of accounts indicates the availability of several personalised and mature services from different agencies, the **lack of a single-sign-on** can create burden to citizens.
- A link to the **Justice Laws Website** is provided, where all law, treaties, and regulations can be found. All this information is stored in an external to the portal website³³.
- There is a useful **list of all official Government of Canada social media channels**³⁴. At the time of the survey, 763 entries existed on this list.
- There is a portal section called “**Government-wide reporting**”³⁵ where a lot of information can be found for administrative decisions, increasing transparency e.g. expenses for all travel expenses.
 - In the above section, the **GC Infobase** can be found³⁶ which provides the latest information on all government finances, people and results. As explained there, “*the GC InfoBase is an interactive data-visualization tool, transforming complex federal data into simple visual stories for Canadians.*” We consider it an **impressive and best practice implementation for accessing, browsing, downloading, visualizing and monitoring important government data**. It also provides all the data in machine readable format (CSV) and the datasets metadata in JSON, DCAT (JSON-LD/XML) formats. This publication practice can also be considered as **best practices in the area of publishing open data**. All the data is available under the **Open Government Licence – Canada**. The licence allows reuse for any reason with attribution and is similar to the one used in the UK portal (see part 2.3.1).
 - In the same section of the portal, there is a section called: “*Mandate Letter Tracker: Delivering results for Canadians*”³⁷. This is a very interesting webpage that **monitors policy results**, as it provides detailed access and explanation to 366 government commitments tracked by the Government of Canada and review their progress

31 For example: <https://www.canada.ca/en/services/health.html>

32 <https://www.canada.ca/en/government/sign-in-online-account.html>

33 <http://www.laws-lois.justice.gc.ca/eng/>

34 <https://www.canada.ca/en/social.html>

35 <https://www.canada.ca/en/transparency/reporting.html>

36 <http://www.tbs-sct.gc.ca/ems-sgd/edb-bdd/index-eng.html#start>

37 <https://www.canada.ca/en/privy-council/campaigns/mandate-tracker-results-canadians.html>

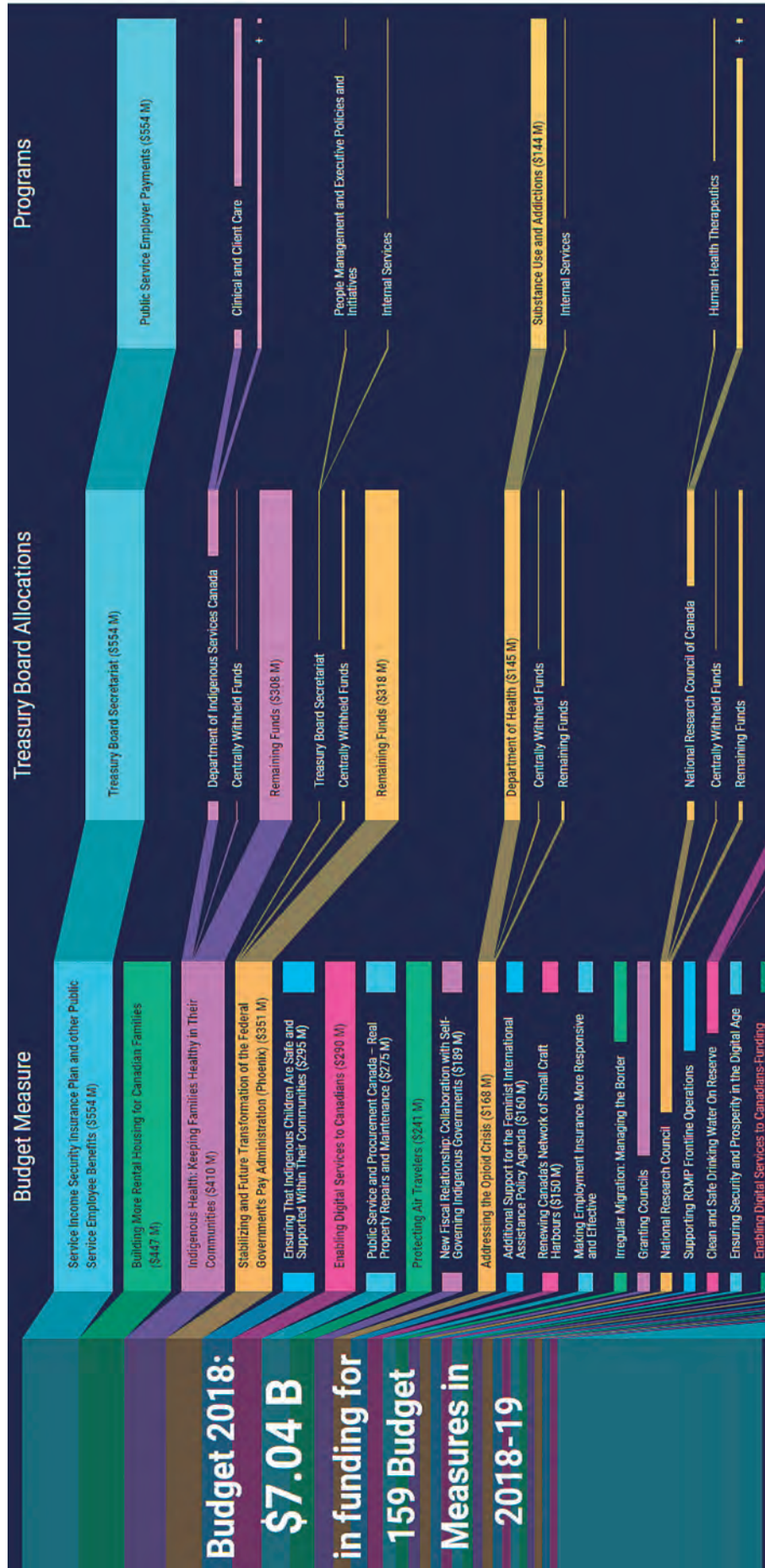


Figure 5: Visualisation of budget allocations (@ <http://www.tbs-sct.gc.ca/ems-sgd/edb-bdd/index-eng.html#budget-measures/budget-measure/overview>)

grouping them in categories based on their progress status. The interface allows users to search by policy area e.g. Fair and Open Government or by progress status e.g. which results are not being pursued. Similar to the CG Infobase, all the dataset with indication on the progress can be **downloaded in CSV format**³⁸ under the **Open Government Licence – Canada**. In Figure 6, a summary of progress in the various commitments appears.

- There is a page where **third-party mobile applications** created using governmental data are listed³⁹.
- There is a section **“How Government works”** that presents very rich information on several aspects of the government function. It is a useful gateway for anyone that wants to understand the Canadian government.

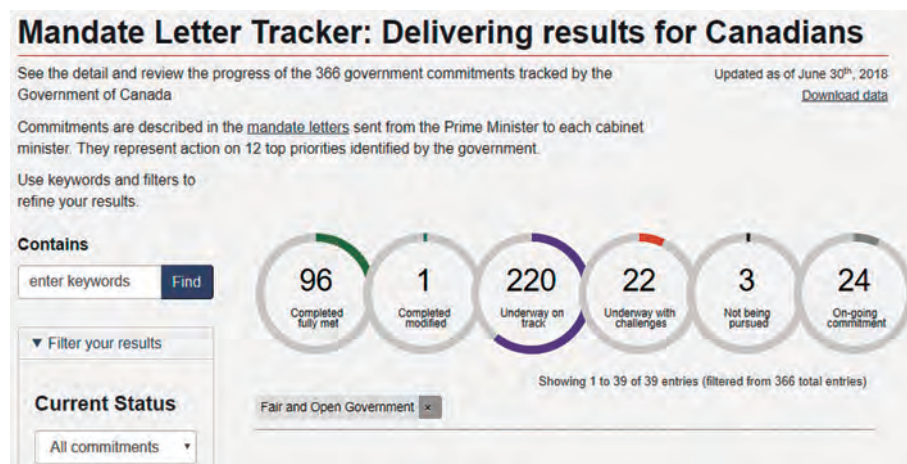


Figure 6: Monitoring policy results in Canada

- There is a link to the **Open Government** section of the portal⁴⁰. This is the only portal from the five we analysed that provides a similar link to the open government policies of the country from its first page. This part provides access to three basic areas:
 - **Open data**: where the user can search Government of Canada data in the open data portal hosting over 80.000 datasets⁴¹, browse open maps with geospatial data⁴², learn how to work with datasets⁴³, see what people have done with government data in Canada through the apps gallery⁴⁴.
 - The **open information** section provides easy access to all of the Government of Canada’s information. This provides Canadians with greater transparency of government programs, activities, publications and spending.
 - **Open dialogue**: this is the place where all public consultations can be found⁴⁵. Moreover, it hosts an interesting initiative, the **Government of Canada Developers Exchange (GC DevEx)**⁴⁶. This is a website designed to make it easier to **collaborate on open source** digital solutions. Teams within the Government of Canada can post contract opportunities, and developers can find contract opportunities. The dollar value of these contracts cannot exceed \$9,999 CAD. All procured code is licensed as open source and housed on GitHub to encourage re-use.

38 https://open.canada.ca/data/en/dataset/8f6b5490-8684-4a0d-91a3-97ba28acc9cd?_ga=2.125698572.768008839.1535388525-516769088.1535388525

39 <https://www.canada.ca/en/mobile.html>

40 <https://open.canada.ca>

41 https://open.canada.ca/data/en/dataset?portal_type=dataset

42 <https://open.canada.ca/en/open-maps>

43 <https://open.canada.ca/en/working-data>

44 <https://open.canada.ca/en/apps>

45 <http://www1.canada.ca/consultingcanadians>

46 <https://gcdevexchange-carrefourproggc.org/en>

2.3.1 Finland

The Finnish portal provide several good practices that deserve attention in the context of this survey. We do not repeat good practices already reported in the previous countries, we only focus to ideas and implementations identified in the Finnish portals.

Finland has a website which is the information portal of the Finnish Government⁴⁷, whereas there is a separate website as the e-service and public service information portal⁴⁸ for citizens, businesses and administration. Open government data is covered by another website⁴⁹. Information on e-participation and e-democracy is found in at least three additional websites⁵⁰.

This approach of having **several websites for different purposes** i.e. general information, services, participation, open data can be found in several European countries. However, it would have been very useful for the users to present **one central entry page**, where all this ecosystem of portals and platforms are presented at high-level, so that they know from one point what services and offers exist from their government in general. We focus our analysis and the identification of interesting practices in the e-service portal called Suomi.fi.

Suomi.fi is a web portal in which users can find the public services and information for different situations. It offers public administration customers a single point of access to services and to the customer's own information, electronic messages and authorisations.

Suomi.fi presents **separate spaces for citizens, companies and authorities**. For the first two, there are separate site sections for: Information and services, e-Authorisations, Registers. Citizens have also access to the Suomi.fi messaging service. These are discussed in more detail below.

- **Information and services for citizens and businesses.**

The Finnish portal is organised as a **deep portal**, where all the content and service descriptions are described within the portal domain. Suomi.fi offers informative contents for different situations and topics in citizens' life and in companies together with practical guidelines and advice on using public services, which help users find the key services.

There is very interesting organisation of content. The portal does not provide just a list of services to choose from. It **splits the overall domain of public services in some logical categories** and provides a two-level classification of activities. The areas defined for citizens can be seen in Figure 7: Organisation of information and services to citizens in Finland. Figure 7 below, a similar chart of areas is available for the services available for companies and organisations. When a citizen chooses one area, detailed information is provided in a very well structured and organised, so that the citizen can get a broad overview on the topic of interest. Only at this stage, a list relevant services to the specific situation is proposed by the system.

We consider this as a good practice since **rarely citizens know beforehand exactly which service they want** to execute. They need to understand the **context** and find the **whole spectrum of services** that are available in a specific topic.

An additional, rather unique feature is that the services listed per topic does not only include service provided by the central government, but also from **municipalities** and other public entities **at local and regional level**. Although this is a nice feature, for the time being not all municipalities have registered their services in the portal. As a result, for several services, only some municipalities appear to provide services, while in reality, we assume that other municipalities provide also similar services, but these are not yet registered in the portal⁵¹. We assume here that this a new portal functionality and that gradually more content from local authorities will be available via the portal.

47 www.valtioneuvosto.fi

48 www.suomi.fi

49 https://www.avoindata.fi/en_

50 <http://www.demokratia.fi/>, www.kansalaisaloite.fi, www.otakantaa.fi

51 For example for the services for immigrants, it is only the small city of Porvoo that has registered a service in the portal: <https://www.suomi.fi/citizen/immigration-and-emigration/moving-to-finland/guide/as-an-immigrant-in-finland/integration-services-help-the-immigrant/services>, accessed 29/8/2018

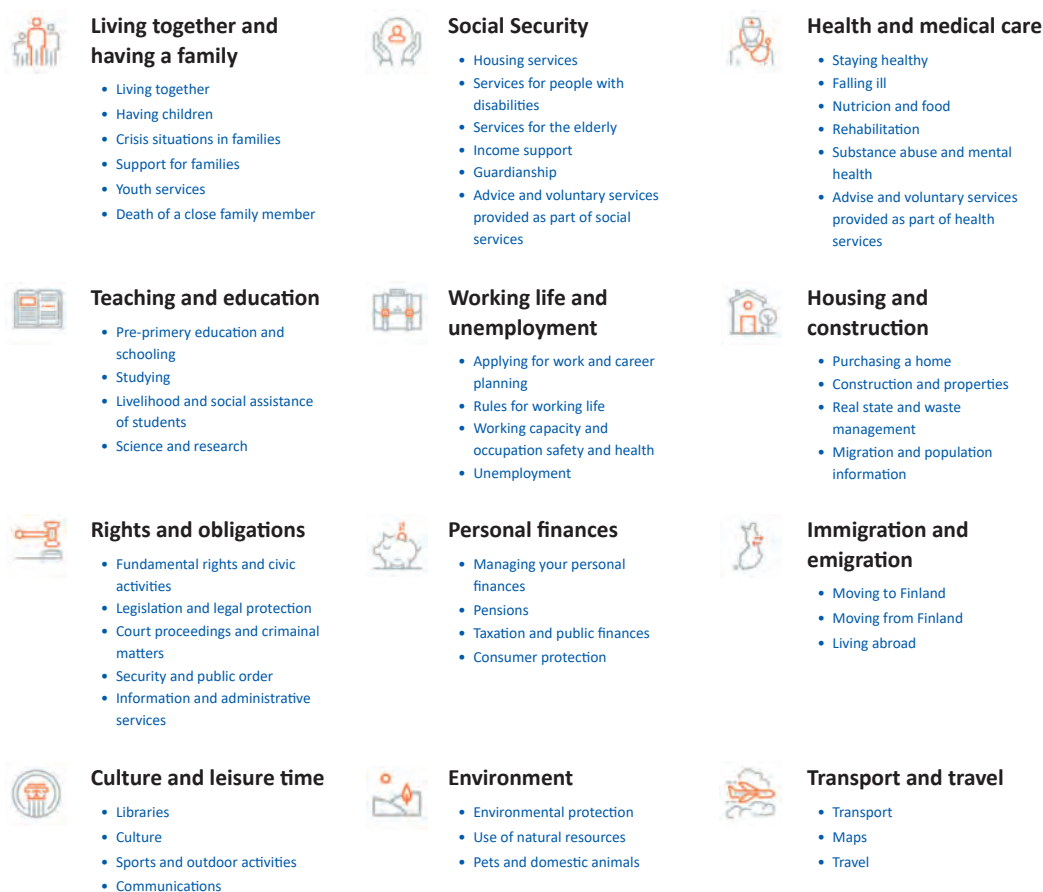


Figure 7: Organisation of information and services to citizens in Finland

- Suomi.fi e-Identification**

Suomi.fi **e-Identification** enables the citizens of Finland and from other European Union countries to be recognized 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 (571/2016).
- Access to personal information via access to Registers**

This is a very important and very interesting feature. The Suomi.fi portal provides part of its content only to registered users/citizens. A registered user **can see her/his personal content** when s/he has identified herself using one of the following identification medium: banking IDs, certificate card or mobile certificate.

This service provides to the user **information and data kept in several public registries**. Citizens can browse their own data such as personal, real property and vehicle information stored in the different public administration registers. They can even receive instructions for **changing the registered information** if they find mistakes.
- e-Authorizations**

Via the platform, citizens and businesses can **authorise another person or a company** to act on their behalf in the matters they choose. They can also choose the identification medium: banking IDs, certificate card or mobile certificate. The e-Authorizations service runs in the background of many authorities' web services, e.g. the service checks whether the guardian may use the services on behalf of his or her underage child or whether the authorised signatory may act on behalf of the company.
- Messages**

There is one common place at national level for Communication and Notification with the central government. Registered citizens and businesses get **notices, notifications and**

other important messages from the authorities straight into Suomi.fi Messages⁵² instead of traditional paper mail. The service also allows users to send messages and attachments to some of the organisations or to get messages in a mobile app.

In addition to these innovative services to citizens, there are also some very interesting services provided to organisations. These are summarized below in the figure.

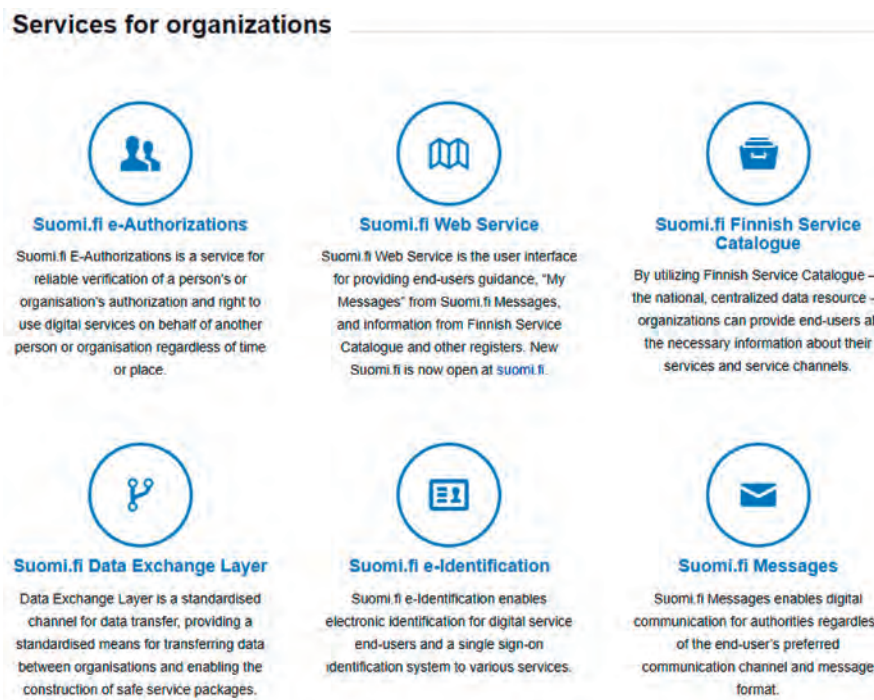


Figure 8: Suomi.fi services for organisations

- Finnish Service Catalogue**
 The **Finnish Service Catalogue**⁵³ forms a directory of primarily **public services available in Finland**, and its data model is intended as a **common national data structure**. The Catalogue is a concentrated data repository where organisations that either have the obligation or right to use it to **provide information on the services and service channels** they offer as well as information on the organisation connected to the service.

 During drafting the report, it was not able to access the catalogue. Moreover, we found some controversial information for the **data model** used for describing the **service meta-data**. The Service Data Repository data model 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. While it was announced by the competent authority⁵⁴ that the model **"is based on the Core Public service Vocabulary (CPSV)"**⁵⁵, the information we found in the catalogue explanatory pages points the use of another, custom-made data model. Migrating the catalogue to comply with the CPSV-AP specification, which seems to be under progress now, is considered a sound decision that **supports interoperability and standards-based development**.
- Suomi.fi Data Exchange Layer**
Suomi.fi Data Exchange Layer⁵⁶ offers a standardised way for **transferring information between organisations**, providing an **interoperability** infrastructure, a kind of **service bus**, and enabling the building of safe service entities for citizens, businesses and authorities. This infrastructure is based on the **Estonian X-Road** platform⁵⁷.

52 <https://www.suomi.fi/messages>

53 <https://esuomi.fi/suomi-fi-services/suomi-fi-finnish-service-catalogue/?lang=en>

54 https://joinup.ec.europa.eu/sites/default/files/event/attachment/presentation_ruuskanen.pdf

55 https://ec.europa.eu/isa2/solutions/core-public-service-vocabulary-application-profile-cpsv-ap_en

56 <https://esuomi.fi/suomi-fi-services/suomi-fi-data-exchange-layer/?lang=en>

57 <https://e-estonia.com/solutions/interoperability-services/x-road>

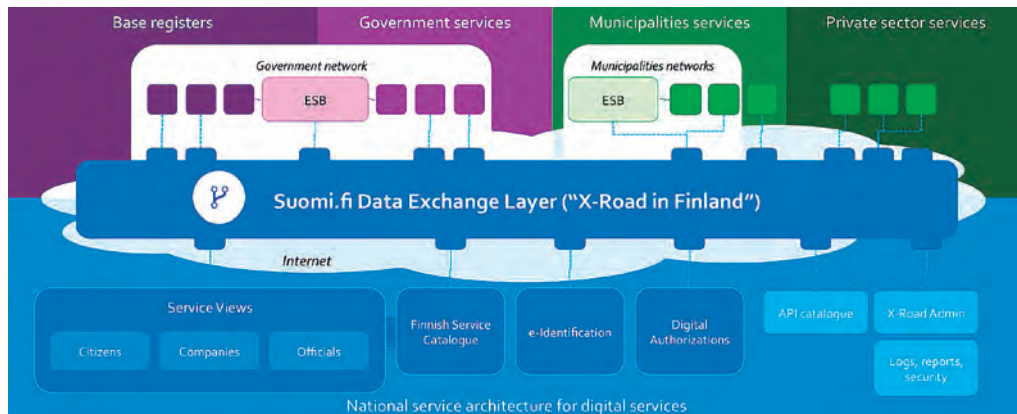


Figure 9: The Finnish Data Exchange Layer based on X-Road

- API Catalogue**
 The **API catalog**⁵⁸ is an up-to-date **index of APIs within the National Data Exchange Layer**. The purpose of the API catalog is to help service providers and realizers to develop more efficient electronic services and support the **reuse of data**. The API catalog contains descriptions of electronic services whose data is available for use by other information systems. It is still in beta version.

2.3.1 Estonia

In Estonia, special focus is placed on the **'once only' principle (OOP)** in e-government and data management, meaning that *"the State is not allowed to ask citizens for the same information twice"*. The European TOOP project⁵⁹ promotes the once-only-principle which has gained a lot of momentum during the last years in Europe. To achieve results in this direction, Estonia has put emphasis on the interconnection of base registries with what is called **X-Road infrastructure**. X-Road is a service bus that allows the interconnection, data sharing and interoperability among a large number of Estonian public organisations.

For the purpose of this report we focus on the Estonian portal⁶⁰ which seems to be quite advanced in providing personalised services to registered users.

- General portal functionalities and design features** that attracted our interest include the following:
 - The portal presents at its first page a link to a page with **usage statistics**⁶¹.
 - The portal is **linked and can bring data from other 29 public sector information systems**⁶².
 - There is a module that allows the **customisation of the UI** for visually impaired people.
 - An **advanced search module**⁶³ allows users to search the portal by defining their profile e.g. citizen, teenager, pensioner, entrepreneur, etc.
 - All pages for the portal have **"Add to My links", "Print", "Share", "Send to a friend", "Ask a questions"** buttons providing the respective functions.
- Personalised services and access to data**
 As the system provides many services to Estonian citizens, the information and services

58 https://liityntakatalogi.suomi.fi/en_GB/

59 <http://www.toop.eu/>

60 <https://www.eesti.ee/et/index.html>

61 https://www.eesti.ee/eng/topics/business/riigiportaali_abi/partnerile_1/eesti_ee_2016_aasta_statistika

62 https://www.eesti.ee/eng/topics/citizen/riigiportaali_abi/lingid_teistesse_infosusteemidesse

63 <https://www.eesti.ee/portaal/!portaal.otsi>

we had access as non-registered user was only a fraction of what is available. It is primarily information about eligibility rules and the process to apply for a service and is available under the tab “Topics” at the first page of the portal.

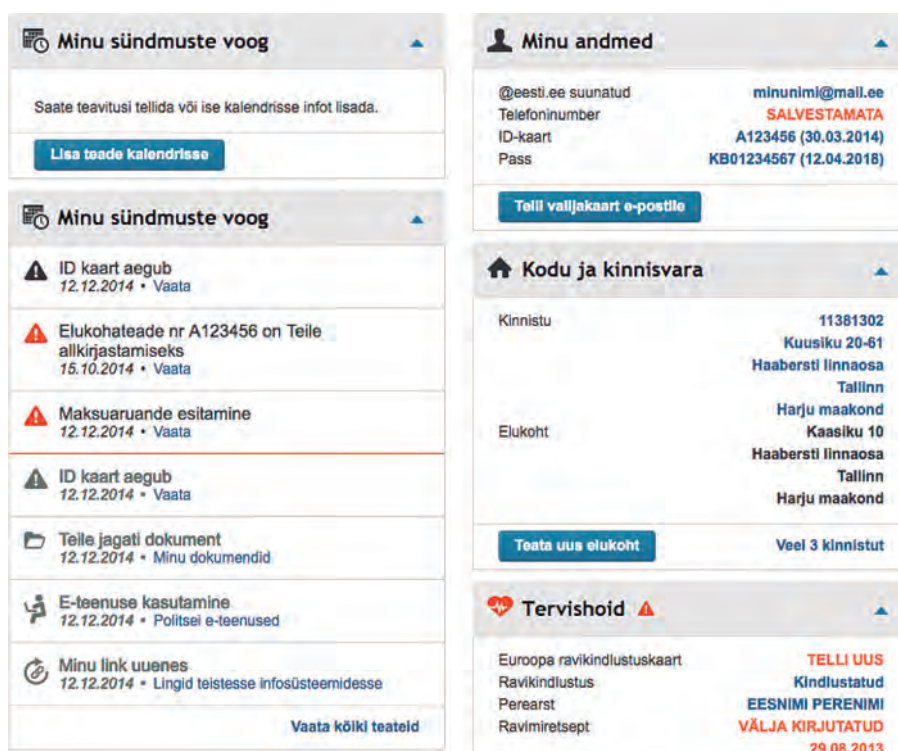
In the “Services” tab the real **electronic services** are provided to citizens, businesses and officials. Estonian citizens can use their ID-cards, mobile-ID or their bank log-in service to log to MyEesti, the section of the portal that targets Estonian citizens and residents. To use an e-service from there, users can search services ‘For a citizen’, ‘For an entrepreneur’ or ‘For an official’ and then choose the topic under which the service belongs.

In the tab “My Data” citizens have **access to the data kept from public registries**. This is a very interesting functionality similar to what we found in Finland. This service may seem a simple idea, but its implementation is based on very advanced **back-office system integration**: through the X-Road service bus, data and information from 29 agencies can be aggregated and presented to the citizen.

The service first became available in 2013, as a homepage for users which gathers information about a person from different registers to one page. This allowed users to have a quick and easy overview of their data. An example can be found in Figure 10. In 2017, a data monitoring system was implemented. This allows Estonian citizens to get an overview of the state institutions that have used their data. The citizen e.g. can see that the police had accessed his car plate number and date of birth on a specific day. Unjustified access of data can trigger enquiries from the citizen to the authorities, e.g. why the tax authorities checked my university diploma.

- **Electronic Document Archive**

The service “My Documents”, or ODIS (official documents infrastructure service), makes it possible for citizens and businesses to securely **send, receive, store, manage, upload, download and share documents**, including pre-given online application forms, messages, replies to received documents etc., with governmental institutions, their information systems and other service users, as well as to sign them.



The screenshot displays two panels of personal information from the MyEesti portal. The left panel, titled "Minu sündmuste voog" (My event stream), lists several events with dates and actions:

- Teate teavitusi tellida või ise kalendrisse infot lisada. (Add notifications to calendar or add info to calendar yourself)
- Lisa teade kalendrisse (Add notification to calendar)
- ID kaart aegub 12.12.2014 • Vaata (ID card expires 12.12.2014 • View)
- Elukohateade nr A123456 on Teile allkirjastamiseks 15.10.2014 • Vaata (Residence declaration nr A123456 is for your signature 15.10.2014 • View)
- Maksuaruande esitamine 12.12.2014 • Vaata (Tax return submission 12.12.2014 • View)
- ID kaart aegub 12.12.2014 • Vaata (ID card expires 12.12.2014 • View)
- Teile jagati dokument 12.12.2014 • Minu dokumendid (Document shared to you 12.12.2014 • My documents)
- E-teenuse kasutamine 12.12.2014 • Politsei e-teenused (E-service use 12.12.2014 • Police e-services)
- Minu link uueneb 12.12.2014 • Lingid teistesse infosüsteemidesse (My link updates 12.12.2014 • Links to other info systems)
- Vaata kõiki teateid (View all notifications)

The right panel, titled "Minu andmed" (My data), shows personal details:

- @eesti.ee suunatud minunimi@mail.ee
- Telefoninumber SALVESTAMATA
- ID-kaart A123456 (30.03.2014)
- Pass KB01234567 (12.04.2018)
- Telli valljakaart e-postile (Order municipal ID card by email)
- Kodu ja kinnisvara (Home and real estate):
 - Kinnistu: 11381302, Kuusiku 20-61, Haabersti linnaosa, Tallinn
 - Elukoht: Harju maakond, Kaasiku 10, Haabersti linnaosa, Tallinn, Harju maakond
 - Teata uus elukoht (Report new residence) | Veel 3 kinnistut (3 more properties)
- Tervishoid (Healthcare):
 - Euroopa ravikindlustuskaart TELLI UUS (European health insurance card: NEW)
 - Ravikindlustus Kindlustatud (Health insurance: Insured)
 - Perearst EESNIMI PERENIMI (General practitioner: NAME SURNAME)
 - Ravimiresept VÄLJA KIRJUTATUD 29.08.2013 (Prescription: DISCONTINUED 29.08.2013)

Figure 10: Example of personal information retrieved from several registries in Estonia

Last, although not directly linked with the service portal, it deserves mentioning the Estonian **e-Residency** initiative. As advertised by the Estonian Government: “Estonia is the first country to offer e-Residency, a government-issued digital ID available to

anyone in the world. E-Residency offers the freedom to easily start and manage a global business in a trusted EU environment". The programme tries to attract **entrepreneurs** from Europe and other countries to start up their remote business in Estonia. It offers a full **set of tools for managing and running the business remotely**, while having access to the Estonian government digital services. In the portal, there is a case and testimony of a **Brazilian citizen** that created a successful games company in Estonia using the e-Residency opportunity⁶⁴.

Official forms are the requests, queries, etc., that have so far been presented by filling out papers and signing and delivering them to the institution. At the state portal⁶⁵ You can send official forms by filling out the form on the screen and pushing the "Send" button. The completed form is sent automatically to the institution that has added the form to this system and is its administrator.

2.4 Findings and recommendations

In this part, we present first some general findings from our analysis and then we draft recommendations to be taken into account for the design of governmental portals.

2.4.1 The ecology of governmental portals

From the analysis, it became clear that there is a variety of different types of governmental portals serving partially different purposes. In some cases, a number of these portals are aggregated or just logically connected, in some other cases, we find cross-references amongst them, while elsewhere it seemed that each individual portal completely ignored the existence of the others. Although the scope of this survey has been one particular type of portals (service portals), we list below and comment on the most important portal types we encountered during our analysis based on what was their primary focus:

- Portals providing the structure of government with or without information about personnel

Public administrations are big, complex and sometime chaotic conglomerations of ministries, agencies and other entities. Documenting and even more challenging maintaining one central point of reference for the overall public administration is a project of high importance.

The best practices here include a series of issues:

- a) clear governance and roles e.g. on who owns the catalogue, and management processes e.g. how and when we update the catalogue,
- b) open data, as this information should be accessible to all society at no cost,
- c) machine-readable versions for bulk data i.e. the whole government structure, and through open APIs that allow querying the data e.g. allowing queries like "give me all units of a ministry", so that developers can easily reuse the data,
- d) the use of standards to describe the public organisation, e.g. the Core Public Organisation Vocabulary⁶⁶,
- e) the documentation of all explicit and implicit relationships among public entities
- f) visualisation tools and models to help the user navigate through the maze of public agencies

- Service Portals

This type of portals was actually the target of this survey. Service portals have been for several years the typical "eGovernment portal" for many countries. They exist already from the early '00. At first, they were focusing on providing information about public

64 <https://e-resident.gov.ee/meet-the-e-residents/#we-built-a-global-games-company-with-e-residency>

65 <https://www.eesti.ee/portaal!/evormid.saatmine?isik=H>

66 <https://joinup.ec.europa.eu/solution/core-public-organisation-vocabulary>

services. Gradually, they started offering electronic execution for some services. The list of services that can be fully executed online is constantly growing in these portals. Countries like Estonia and Finland have managed to provide a large percentage of their overall service catalogues as fully executable electronic services, reducing and replacing physical visits and paper documents with electronic access to base registries.

In these countries, we witness an interesting transformation which could be seen as a paradigm shift, from document-based to data-centric administrations. When all registries are connected via an enterprise bus infrastructure and information is shared across all government in multi-seconds, we don't anymore need documents to store information in paper and citizens to act as postmen moving these documents from one office to the other. This is an important shift that needs to be taken into account. This asks governments to focus from e-document automation systems to data-centric exchange approaches and systems.

Good practices here are similar to those for providing data for governmental structure:

- a) clear governance and roles (e.g. who owns the catalogue of services), and management processes (e.g. how and when the catalogue is updated)
 - b) service descriptions available as open data,
 - c) machine-readable versions both for bulk data i.e. the whole service portfolio, and through open APIs that allow querying the data e.g. allowing queries like "give me the service related to my move to a new town", so that developers can easily reuse the data,
 - d) the use of standards to describe public services, e.g. the Core Public Service Vocabulary⁶⁷,
 - e) the documentation of all explicit and implicit relationships among public services, to create a service portfolio which is something much more than a simple flat catalogue of services,
 - f) visualisation tools to help the user navigate through the maze of public services.
- **eParticipation Portals**
There is another family of governmental portals, websites and application that aim to support citizens' participation and democracy. These portals are further discussed in the next section of the survey. Only in Australia and Canada we found clear connections between service and eParticipation portals.
 - **Laws and case law portals**
Legal portals provide systematic access to legislation and/or to case law. A typical and well-implemented example of this portal type is the EU law portal⁶⁸. We did not find strong connections between legal and service portals. The use of standards like ELI⁶⁹ for legislation and ECLI⁷⁰ for case law could be considered as good practices for these portals.
 - **Administrative decisions**
There are some few cases of portals dedicated to document administrative decisions in a systematic way. One good example that is consider an international good practice is the Greek Diavgeia (meaning Clarity) portal⁷¹. There more than 25 million decisions have already been registered, creating a huge knowledge base and administrative memory for the administration.
 - **Open data**
Governments possess a large amount of basic data which is of critical value for society, not only with respect to the economic. In this context, governments of different countries all around the world are developing policies to release this kind of data as Open (Government) Data. In 2018, the number of countries with Open Government Data (OGD) portals has reached 139, comprising 72 per cent of all United Nations Member States⁷².

67 https://ec.europa.eu/isa2/solutions/core-public-service-vocabulary-application-profile-cpsv-ap_en

68 <https://eur-lex.europa.eu/homepage.html?locale=en>

69 <https://eur-lex.europa.eu/eli-register/about.html>

70 https://e-justice.europa.eu/content_european_case_law_identifier_ecli-175-en.do

71 <https://diavgeia.gov.gr/>

72 https://publicadministration.un.org/egovkb/Portals/egovkb/Documents/un/2018-Survey/E-Government%20Survey%202018_FINAL%20for%20web.pdf

In general, service portals are not connected with open data portals. This may happen due to the fact that usually different agencies have the mandate for openness from those responsible for providing eservices. Although the service portals are usually introduced with titles like *“find government services and information”*, it was difficult to find links to open data portals in most of the cases we examined. It seems that open data portals are kept in separate “spaces” and they are not connected, at least at the initial landing pages, with the service portals. One exception here is Canada, where at the central service portal there is a link to “Open Government” initiatives.

In the open data portals that we found, the use of open data standards for describing datasets counts as a good practice. More particularly, DCAT has already become a kind of a de facto standard in Europe and its usage also spreads to other continents, e.g. the Canadian open data portal uses DCAT, too.

- **Open information**
Interestingly, in Canada, we found two “open” portals, one on open data and one on open information. While open data refers mainly to the publication of datasets, open information refers to publication of assessments/audits, financial statements, strategic plans, policies, and other types of publications⁷³. We found this differentiation interesting. Amongst others, there are different kind of tools and competences needed to analyse data if compared to those needed for publishing and using “information” as defined in the Canadian portal example.
- **Performance and results monitoring**
The UK and the Canadian implementation of performance and results monitoring are considered world-class best practices. Both countries have put in place advanced systems providing impressive data to citizens and businesses.

These portals build upon several elements that are all necessary to co-exist: a data-driven culture, the application of open government principles, modern managerial and financial theories and practices, standardised business processes, common data standards and exploitation of new data technologies. In these countries the performance portals are closely related to the service portals.
- **General country info**
These are portals that provide general and mainstream information about the countries. In some cases, service portals appear to be parts of this type of over-arching, “umbrella” portal.

2.4.2 A matrix for the evolution of governmental service portals

We discuss below two dimensions of governmental service portals maturity and we present a matrix table to capture possible options.

Deep versus shallow portals

We differentiate between “deep” (e.g. UK, Canada, Estonia, Finland) and “shallow” (e.g. Australia) portals. By “deep”, we refer to portals that maintain information in their own domain, while “shallow” portals are actually light catalogues (aka yellow pages, registries) that provide descriptive information, metadata and URL links to other websites where the actual information about services exists.

We found that there is an evolution from “shallow” to “deep” portals. Historically, the creation of websites starts in a bottom-up fashion: ministries and agencies develop their own websites to their relevant content and description of their services. Soon, this approach results in a fragmented environment of some dozens or hundreds of governmental websites. Countries then realise the need for harmonization and uniform access to all this content. Usually they start this consolidation effort by putting in place light portals as they need first to document in yellow pages (registries) where the relevant information is originally stored. This initial effort should not be underestimated as at this stage nobody knows how many websites exist and what services and data they

⁷³ <https://open.canada.ca/en/open-information>

offer. The initial effort to create this yellow page type of portal is in fact the first phase of an indexing and cataloguing project. Only when this first catalogue is created, the real harmonization process can start with e.g. the use of common templates for organizing and presenting content, imposing a standard URL schema for all governmental portals, asking for the provision of similar functionalities and the promotion of common metadata standards for describing data and services.

At this stage, strong central coordination with full political coverage is needed to establish and promote the common features across all governmental websites. This coordination can be materialized as guidebooks and common guidelines, cross-agency committees, and procurement of shared services.

The central portal starts gaining depth when it starts integrating other portals, the data and the information provided by them. If domain specific aggregator portals exist already (e.g. a portal for health or for immigrants) then the central portal can easier grow.

One commonly used online service for advanced portals is the setup of personal accounts for the purpose of accessing personalized online services followed by payments of utilities. The opening of a personal account is considered a pre-condition for more advanced, transactional public services online. Issues related to electronic identification should be first solved and the pioneer countries show that the best practice is to use alternative ways for identification, including e-ids issues by the banking sector (e.g. in Estonia).

It is important to stress that the results we see in deep and advanced portals like those discussed in this survey cannot be achieved just by procuring state-of-the-art technology and platforms. These results are supported by certain standards, business processes, organisations and roles, policies, human resources and legislation. A country that starts the journey towards advanced service portals providing personalised services to a wide range of policy areas should understand the complementarity and the necessity of all the above and avoid pursuing results out of a mere technology perspective with only IT project and procurement.

One of the most advanced manifestation of new technologies, data-driven culture, open government principles, open data techniques, modern managerial (e.g. management by objectives, benchmarking) and financial (real-time budget monitoring) theories and practices, robust standardised business processes and common data standards has been the Canadian data publication, visualisation and infographics platform. As already highlighted above: such platforms cannot be just procured off-shelf. They need a technical, organisational and legal setting that should pre-exist.

Informational versus executional portals

There are several eservice maturity models that refer to a scale of maturity. This usually starts from providing information to the users, all the way to fully execute services in an interactive mode (transactional), via what is usually called one-stop-portal. The latter addition to this scale is the no-stop-government: these are cases where the execution of certain services is automatically triggered without human intervention due to certain events. The user does not need to apply or contact any agency physically or even electronically. The service is initiated and provided automatically according to the encoded business rule and logic by the information systems of the participating to the process agencies. An example is the increase on a public servant salary after getting married. In a no-stop-gov environment, the employee needs no interaction with any authority or even his/her employer after getting married: the marriage event automatically sends an update to the payment system and the extra household benefit is added in her/his salary from the date of marriage.

However, and although the information versus transaction/personalisation scale is very popular in different assessing maturity models for public services, we see an important limitation to these approaches: we need to acknowledge the fact that inside the informational stage there are serious maturity differentiations. For example, an interactive, dialogue-based system that provides personalised information about eligibility or not for a service, or sends automatic alerts and notifications based e.g. on profile, location is completely different in design, complexity and value to the users compared to a static service list that provides general information about public services. To the existing models, both these systems are classified as “informational” as they do not execute a real public service.

This move from simply providing information about services to offer fully electronic and automated services is another dimension to be added to the one discussed above for shallow versus deep portals. Below in the figure we combine the two evolutionary paths in a matrix table providing the basic characteristics per quadrant.

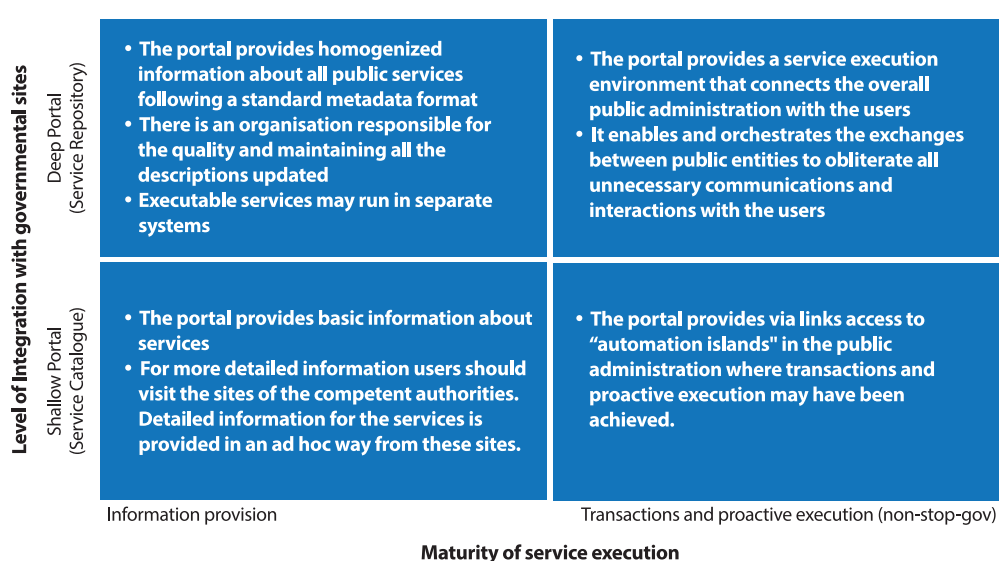


Figure 11: The service portals evolution matrix

2.4.3 Recommendations

In this part, we form a list of recommendations that could be taken into account for the improvement of the Brazilian service portal. We group the recommendation to four areas: service catalogs and organisation of content, portal and webpages design, personalization, and the governmental portals that should become available.

A Service catalogs and organisation of content

- A.1 **Start with shallow portals** to start cataloguing what services exist. Continue by **integrating service descriptions in a central point** using a uniform presentation and documentation approach.
- A.1 Promote **common service descriptions and visual templates for descriptions of eservices** across the government.
- A.1 Organise centrally services in **logical bundles**. Life-events and broader areas of activity can be used to guide this categorization. The UK three-layer organisation is a benchmark and can be used as a starting point.
- A.1 Start creating a **service portfolio** by making service relationships explicit, e.g. when chronologically the execution of one service should take place before another, the output of one service is an input to another, the life situation asks for the execution of a services together, etc.

- A.1 Support the service descriptions with **contextual information**, e.g. when, why to whom these services are addressed, different distribution channels, average waiting time, costs, periodicity, etc.
- A.1 Use existing **metadata standards to describe public services**, e.g. CPSV and make their descriptions available in human and machine-readable versions.
- B *Portal and webpage design*
 - B.1 Utilize modern **data publishing and interactive visualisation platforms** to provide insightful access your services, information and data
 - B.1 Use **mobile-friendly design** for all portal pages
 - B.1 Use **explanatory videos** whenever necessary e.g. complex services, complicated context, strong messages difficult to communicate via text, etc.
 - B.1 Support **real-time interaction with web chats** applications.
 - B.1 Provide clear, open by default unless certain restrictions apply **licensing information** for resources (e.g. content, publications, applications) and data you provide.
 - B.1 Provide **multilingual support** wherever relevant.
 - B.1 Respect **accessibility standards** e.g. use audio players and screen customisation applications to make easier the access.
 - B.1 Include in **each portal page**: feedback mechanisms, “date modified” info, “share this page” “add to my links”, “send to a friend”, “print” features.
- C *Personalization*
 - C.1 Provide **unique e-Identification** for all citizens and companies. This unique identification can be implemented with various methods e.g. eIDs, hard ID-keys, reuse existing identification mechanisms (banking) etc.
 - C.1 Enable **personalised access to the portal**. You can start with accounts and users to customize what they see, and you can continue by adding to their personal spaces documents, decisions, and their data.
 - C.1 **Exploit users’ profiles to provide personalised services**. By profiling a user, you can propose services and payments (e.g. the Australian implementation) or check eligibility for a service. For example, instead of asking the user to read (and understand) a complicated law to assess whether s/he is eligible for a grant, just ask him/her a set of questions using a dialogue-based system to inform him/her on eligibility.
 - C.1 Give the **possibility to the citizens to check what data public administration keeps for them**. Provide also access information to this data: who accessed the data, when and in which context, e.g. after the request of a service or a traffic violation. The “My Data” section in the Estonian portal can be considered state-of-the-art implementation, where citizens can not only see the data public administration stores about them, but also check who and when accessed this data. This personal “data spaces” is definitely a trend that needs attention.
 - C.1 **Create central electronic inbox service for messages** coming from public agencies. The Finnish implementation seems to integrate all messages in a single eletterbox, is the best practice identified in the survey.
 - C.1 Allow each citizen and company to **store and check all the documents** that have been exchanged with public authorities.
- D *Central Catalogues*
 - D.1 Create **central portals for: services, public organisations, e-consultations, performance and monitoring information, legislation, administrative decisions, open data, standards**.
 - D.1 A **global entry page** providing access and explaining the purpose and value of all the above portals is considered a good practice for increasing visibility and providing an overview on what kind of electronic resources administration offers to citizens and businesses. More specific recommendations for some of these portals follow below.
 - D.1 **Document the government structure**. Document the whole government structure in a standardised format, putting in place governance and processes for up-

dating it, and making it available to the public in both human and machine-readable formats. The use of standardised metadata schema for describing public entities can be considered a good practice (e.g. Core Organisation Vocabulary⁷⁴).

- D.1 Create a **central point for promoting eParticipation where all consultations, citizens and co-creation initiatives** can be found.
- D.1 Create a **central Open Data portal**, publish open data in machine-readable formats using open standards and describe them using established metadata standards e.g. DCAT.
- D.1 Create a portal space to **monitor performance and results**. Establish the organisational prerequisites (e.g. setting measurable goals), then the business processes (e.g. the monitoring mechanism) and finally put in place the technology. The Canadian Infobase example and the UK performance monitoring can be used as benchmarks in this area.
- D.1 List in one **central place all governmental social media accounts, apps, media-releases**.
- D.1 Create an **official API catalog** for letting developers and architects know what connections to existing systems and what data is already available for reuse. Give motivation for agencies to develop and publish new APIs there.
- D.1 Develop a **common and horizontal data sharing infrastructure** (enterprise or service bus) across all departments and agencies to enable the exchange of data. The Estonian X-Road system, used also in Finland, is considered a good practice in this area. This recommendation goes beyond the governmental portals and catalogs and connects all base registries.

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74 <https://joinup.ec.europa.eu/solution/core-public-organisation-vocabulary>

2.6 Appendix I: List of life-events and service organisation

UK

1. Benefits
2. Births, deaths, marriages and care
3. Business and self-employed
4. Childcare and parenting
5. Citizenship and living in the UK
6. Crime, justice and the law
7. Disabled people
8. Driving and transport
9. Education and learning
10. Employing people
11. Environment and countryside
12. Housing and local services
13. Money and tax
14. Passports, travel and living abroad
15. Visas and immigration
16. Working, jobs and pensions
21. Change of address
22. Grants and funding
23. Indigenous people
24. Veterans
25. Youth

New Zealand

1. Immigration and visas
2. Passports, citizenship and identity
3. Leaving NZ
4. Work
5. Tax, benefits and finance
6. Education
7. Family
8. Transport
9. Housing and property
10. Engaging with government
11. Law, crime and justice
12. Recreation and the environment
13. History, culture and heritage
14. Health
15. Consumer rights and complaints

Australia

1. Benefits and Payments
2. Business and Industry
3. Culture and Arts
4. Education and Training
5. Environment
6. Family and Community
7. Health
8. Immigration and Visas
9. IT and Communications
10. Jobs and Workplace
11. Money and Tax
12. Passports and Travel
13. Public Safety and Law
14. Security and Defence
15. Transport and Regional
16. A-Z of Government Services

Finland

For citizens

1. Living together and having a family
2. Social security
3. Health and medical care
4. Teaching and education
5. Working life and unemployment
6. Housing and construction
7. Rights and obligations
8. Personal finances
9. Immigration and emigration
10. Culture and leisure time
11. Environment
12. Transport and travel

For companies or organisations

1. Starting a business
2. Being an employer
3. Changes and crisis situations
4. Financing a business and business subsidies
5. Financial management and taxation
6. Responsibilities and obligations
7. Developing the business
8. Product and service design
9. Internationalisation
10. For authorities
11. Housing and construction
12. Social and health services
13. Functions of authorities, finance and funding
14. Justice, safety, security and democracy
15. Employment affairs
16. Work and entrepreneurship
17. Culture, sports and tourism
18. Environment, nature and transport

Canada

1. Jobs and the workplace
2. Immigration and citizenship
3. Travel and tourism
4. Business and industry
5. Benefits
6. Health
7. Taxes
8. Environment and natural resources
9. National security and defence
10. Culture, history and sport
11. Policing, justice and emergencies
12. Transport and infrastructure
13. Canada and the world
14. Money and finances
15. Science and innovation
16. Departments and agencies
17. Public service and military
18. How government works
19. Treaties, laws and regulations
20. Sign in to an online account

USA

1. Benefits, Grants, Loans
2. Government Agencies and elected Officials
3. Jobs and Unemployment
4. Money and Credit
5. Travel and Immigration
6. Consumer Issues
7. Disasters and Emergencies
8. Earth and the Environment
9. Education
10. Health
11. Housing
12. Laws and Legal Issues
13. Military and Veterans
14. Small Business
15. Voting and Elections

Estonia

1. e-identity
2. interoperability services
3. security and safety
4. healthcare
5. e-governance
6. mobility services
7. business and finance
8. education
9. <https://www.eesti.ee/en/>
10. Republic of Estonia
11. Health and care
12. Pensions and allowances
13. Family
14. Work and labor relations
15. Entrepreneur
16. Licences and Notices of Economic Activity
17. Disabled people
18. Citizenship and documents
19. Traffic
20. Education and Research
21. Consumer protection
22. Money and property
23. Legal advice
24. Culture and Leisure
25. Housing and Environment
26. Security and defense

United Arab Emirates

1. Visa and Emirates ID
2. Jobs
3. Education
4. Business
5. Moving to the UAE
6. Justice, safety and the law
7. Visiting and exploring the UAE
8. Transportation
9. Finance and investment
10. Environment and energy
11. Housing
12. Health and fitness
13. Passports and travelling
14. Public holidays and religious affairs
15. Infrastructure
16. Social affairs
17. Charity and humanitarian work
18. Connected government (G2G)

3 Access, retention and citizens' participation

Analyze the latest United Nations e-government survey and answer the following questions:

- What are the best practices that leaders in this ranking have in common and which enable better access, retention and citizen participation?
- What are the relevant guidelines for the adoption of these best practices in the Brazilian context, according to the profile of access and use of the Internet in Brazil?

3.1 Introduction

In this part, we investigate the international experience to identify best practices for promoting electronic participation of citizens.

3.2 Civic engagement and e-participation

Enabling meaningful civic participation is a fundamental requirement of well-functioning democracies. The OECD advises that *"governments must invest adequate time and resources in building robust legal, policy and institutional frameworks, developing appropriate tools and evaluating their own performance in engaging citizens in policymaking"* (OECD, 2001, p. 11).

In its essence citizen participation is "a categorical term for citizen power". It allows - if it is specifically designed to do so - the redistribution of power towards those at any time excluded from the political and economic processes (Arnstein, 1969). It can be defined, broadly, as "any activity, individual or collective, devoted to influencing the collective life of the polity" (Macedo et al. 2005, 6). Today, in light of research that points to a loss of social capital (Putnam, 1995) combined with and a decline in trust of government (Nye, Zelikow, and King, 1997), civic engagement is seen as a necessary prerequisite and central component of a vital democracies.

A typology of eight levels of civic participation has been suggested (Arnstein, 1969). This participation ladder includes, at its base, modes of participation as a pretext (1) Manipulation and (2) Therapy. These are effectively "non-participation" excuses for "correcting" the view of citizens on specific issues to align with that of powerholders.

The next four rungs (3) Informing, (4) Consolidation, (5) Placation and (6) Partnership are seen as token efforts that allow citizens to have a voice or offer advice but in reality, actual decision making is rarely influenced through them. The status quo is maintained.

Only the final two rungs, Delegated Power and (8) Citizen Control offer true access to decision-making, or full managerial power allowing citizens to co-create policies and co-evaluate outcomes. It is these two levels that represent the desired level of citizen participation.

The most common approaches to citizen engagement include:

- electoral approaches (running for office, volunteering at campaigns),
- legislative and administrative information exchange approaches (public hearings),
- civil society approaches (participation via volunteer organizations, social clubs, and other forms of association)
- deliberative and consensus-based approaches (joint action across sectors of society, classes of people, or types of individuals).

A unifying strategy that can combine these participatory approaches is to adopt a comprehensive co-production methodology and extend that to include the policy implementation and evaluation phase.

The concepts of co-creation and co-production are often seen as interchangeable and both are as being valuable in themselves. It has to be noted that, however, studies that address the real outcomes and impact of these processes are scarce. If specific outcomes were reported, the emphasis was on whether effectiveness of public service is being enhanced (Voorberg et.al., 2014).

Co-production can be defined as the voluntary or involuntary involvement of public service users in any of the design, management, delivery and/or evaluation of public services (Osborne et.al., 2016). Co-creation of value can enhance public-sector innovation and foster or radical innovation. By including citizen capacities and knowledge, governments can restructure public services, implement new processes, products and methods of service provision that improve in efficiency, effectiveness and quality (Alves, H., 2013).

Co-creation can be based on two trends. First, entities are challenged to produce their goods more efficiently, so end-users are seen as possible co-producers who take over specific activities in production. Second, users or citizens may become co-creators whose experience can be of added value for an organisation. (Voorberg et.al., 2014).

Co-creation can be categorized in three types in terms of degree of citizen involvement: (a) citizens as co-implementer: transfer of implementing activities in favor of citizens that in the past have been carried out by government, (b) citizens as co-designer: involvement in the content and process of service delivery and (c) citizens as initiator: citizens that take up the initiative to formulate specific services. (Voorberg et.al., 2014).

There is significant evidence that the use of ICT to enable *“e-participation technologies expands opportunities for civic engagement, including increased possibilities for people to participate in decision-making processes and service delivery to make societies more inclusive”* (UN E-Government Survey, 2016).

For these purposes e-participation can be defined as the *“process of engaging citizens through ICTs in policy, decision-making, and service design and delivery in order to make it participatory, inclusive, and deliberative”* (UN E-Government Survey, 2012).

The main opportunities and challenges of the application of ICT to participation are summarized in the table below:

Table 2: Challenges and opportunities of using ICT to enable citizen participation

Issues	Opportunities and challenges
Decision and policy making initiated by government	ICT can exploit the vast reserves of data the public sector has available to develop, model, visualise and simulate decisions and policies. Also by involving constituents through political representatives or directly through processes of information, consultation, active participation and elections.
Empowerment from the bottom	ICT can help to leverage the voices and expertise of huge numbers of individuals and groups, setting their own agendas and developing their own policies in new forms of ‘crowdsourcing’, mass collaboration and mass creativity. ³ This can also result in short term single issue politics, and sometimes in instant street politics and forms of mob-rule, but can potentially also build to more permanent countervailing power bases possibly at odds with governments.

Issues	Opportunities and challenges
Empowering communities and localities	ICT can support the extension of participation beyond formal politics and the ballot box, by promoting subsidiarity at local and neighbourhood level. This leverages local resources, know-how and skills for developing new forms of advocacy, support and social capital, which can both strengthen diverse cultures and interests as well as bridge between them.
Transparency and openness	Can be supported by ICT through freedom of information and consultation, to reveal the purposes, processes and outcomes of government, also through real-time tracking and tracing. This will help place responsibility, reduce corruption and make decisions more responsive, although legitimate privacy and the space for risk taking should be safeguarded.
Accountability, rights and responsibilities	ICT contributes to these becoming blurred as decision and policy-making are opened up and government shares the stage with other actors. Important questions are raised about whose voices are heard and who do they represent, with the ever present danger of trivialisation and short-termism unless the right to participate in policy making is balanced with some responsibility for policy impacts.

Source: Macintosh, A. (2009). European eParticipation Summary Report. *European Commission - Information Society and Media DG*, 30. Retrieved from http://europa.eu/information_society (p.7)

The UN produces as part of its eGovernment Survey an E-Participation index (EPI) that measures e-participation according to a three-level model that includes: (i) e-information – provision of information on the Internet, (ii) e-consultation – organizing public consultations online, and (iii) e-decision-making – involving citizens directly in decision processes. In general, these require two-way communication between participants.

E-participation is enabled by three key conditions: (i) explicit focus on official policies, decisions and governance practices to ensure that they respond to people’s needs; (ii) explicit focus on the means of interaction – people should be connected to communication channels in order to express themselves and communicate both among themselves as equal peers and with public authorities as equal partners; (OECD, 2001; Macintosh, 2009) and (iii) explicit focus on the content of the interaction process between citizens and government (OECD, 2001) to ensure the quality and legitimacy of e-participation outcomes. According to the above criteria a country ranking in terms of their performance is produced as appears on the table below.

3.2.1 Selecting best practices

The study aims to examine good civic engagement practices and their supporting websites or portals of some of the best performing countries according to their EPI rating while highlighting the challenges and opportunities of e-participation. Countries have been selected from the EPI top ten, evaluated using dimensions and considerations proposed by OECD (2001), Mackintosh (2008), Linders (2012), Tambouris et.al., (2014) and the Measuring and Evaluating e-Participation framework (METEP, UN E-Government Survey 2016) that is also the tool that informs the E-participation Index itself. The list of countries and portals to be analysed appear on Table 4. Table 3 Towards this goal the e-participation initiatives selected will be held against the co-creation classification typology suggested by Linders (2012) while maintaining the basic EPI categorization of (i) e-information (ii) e-consultation and (iii) e-decision-making. The framework is presented on Table 4. It recognizes three stages for participation at the design, execution and monitoring stage while maintaining the possible approaches to governance as Citizen Sourcing, Government as a Platform and DIY Government.

Table 3: Analysed country e-participation portal/websites

Country or Case	Civic engagement site(s)
UK	gov.uk
Spain	transparencia.gob.es/and the Consul Platform
Finland	www.demokratia.fi
Canada	open.canada.ca/en/open-dialogue www.canada.ca/en/transparency/ reporting.html
Singapore	www.reach.gov.sg
Italy	Open.gov.it and bussola.magellanopa.it/home.html
New Zealand	www.digital.govt.nz
OGP best practices	OGP Participation and Co-creation toolkit

The aim will be to use this evaluation of portals and practices to inform **recommendations and guidelines** for the possible adoption of the most successful ones in the Brazilian context.

Table 4: Classification of citizen co-production initiatives (Linders, 2012)

	"Citizen sourcing" (C2G)	"Government as platform" (G2C)	"Do It Yourself Government" (C2C)
Design	<p>Consultation and ideation Citizen consultation enables citizens to share their opinions with government, often in an attempt to improve representation and responsiveness and to help governments best select from among the policy and design alternatives.</p> <p><i>Traditional:</i> Town halls, letters, election board <i>ICT-Facilitated:</i> eRulemaking, IdeaScale, eDemocracy party</p>	<p>Informing and nudging In informing, governments equip citizens with data needed to make informed decisions. In "nudging," government uses behavior economics to design policies and services in such a way that they preserve freedom of choice but encourage the "socially optimal" option (ex: changing "opt ins" to "opt outs").</p> <p><i>Traditional:</i> Brochure, health label <i>ICT-Facilitated:</i> Crime mapping, data mining</p>	<p>Self-organization Citizen to citizen "self-organization" occurs when communities govern themselves with little or no interference from the government.</p> <p><i>Traditional:</i> Neighborhood council <i>ICT-Facilitated:</i> "Smart mob", community portal, virtual world</p>
Execution	<p>Crowd-sourcing and co-delivery In "crowd-sourcing", government turns over a problem or activity for resolution or (co-)execution by citizens so as to tap into the unique skills, talents, and knowledge among the public. At the individual level, this could take the form of personalization whereby the citizen, chooses or tailors the service to best fit their needs. At the level of society, this can take the form of funneling public services through social enterprises and volunteer groups.</p> <p><i>Traditional:</i> Crossing guard, park volunteer, charter school <i>ICT-Facilitated:</i> CrisisCommons, Challenge.gov, PeerToPatent, government-run wikis</p>	<p>Ecosystem embedding Government can create an environment more conducive to private (and peer) production via greater "embeddedness" whereby government agents become a part of the community through informal contributions that create public value and build trust, often outside of official mandates (Ostrom, 1996). More widely, this can take the form of openly sharing government knowledge, infrastructure, and other assets for use by the public that originally paid for them.</p> <p><i>Traditional:</i> Academic alliance, embedded community health workers <i>ICT-Facilitated:</i> GPS, Gov Open Sourcing</p>	<p>Self-service Self-service occurs when government expects citizens to essentially provide a "public" service themselves, sometimes within a facilitating framework provided by government. Examples include turning parks over to community volunteers or neighborhood watches. Self-service can also take a collaborative form whereby citizens help one another, as with car-pooling—the 2nd largest commuter transportation system in the US.</p> <p><i>Traditional:</i> Private school, carpool <i>ICT-Facilitated:</i> Open Source, SETI@Home</p>
Monitoring	<p>Citizen reporting In citizen reporting, citizens provide information (i.e. intelligence) to government. Examples include feedback on government services (user satisfaction, etc.); reporting of crimes and potholes; and corruption monitoring.</p> <p><i>Traditional:</i> 311, 911, survey, office visit <i>ICT-Facilitated:</i> SeeClickFix, FixMyStreet</p>	<p>Open book government Governments are increasingly moving towards "open book government" (Dunleavy & Margetts, 2010) whereby requests for information regimes are replaced by proactive information dissemination and a presumption of open publication. The goal is to make open and public the inner workings and performance of government to empower citizens to hold their government to account.</p> <p><i>Traditional:</i> FOIA, Fed Register, Bulletin <i>ICT-Facilitated:</i> Data.gov, Recovery.gov</p>	<p>Self-monitoring Self-monitoring takes the form of "online citizen testimonial systems" whereby online customer feedback mechanisms replace "top-down, central controls over and regulation of local delivery in hospitals, schools, and local governments" (Dunleavy & Margetts, 2010).</p> <p><i>Traditional:</i> Word of Mouth <i>ICT-Facilitated:</i> Yelp, NHS Choice</p>

What follows is an overview of the main citizen participation portals of high EPI performing countries. In each country unique contributions and specific practices that go beyond the more conventional e-participation tools (as are simple consultation websites) are highlighted and analyzed.

3.3 Country e-participation overview

3.3.1 UK

The UK follows a comprehensive strategy of both soliciting citizens' feedback and allowing them to co-create policy and services. It attempts this through **gov.uk**, a United Kingdom public sector information website, created by the UK Government Digital Service (GDS), a unit tasked with transforming the provision of government digital services, to provide a single point of access to government services. The website was designed to replace the individual websites of hundreds of government departments and public bodies in an effort to implement the 'Digital by Default' strategy decided upon by the UK government.

Beyond digital service delivery gov.uk is used to enable citizen participation by providing data on *data.gov.uk*. It supports **Petitions** through parliaments' online petition platform, **Consultations**, which can be viewed and responded to online, as well as **ad hoc e-participation initiatives** (for example the Womenspeak forum for victims of domestic abuse to influence the development of policy and the 'Workload Challenge' that invited submissions from teachers on how to reduce their workload).

Importantly, gov.uk also provides a Design System and Service Toolkit which contains all guidelines, standards, styles, components and design patterns that teams in government need to create user-centred digital services. All Gov.uk's core code, most of which is open source, is released openly via the collaboration platform GitHub⁷⁵. Members of the public can suggest corrections and improvements.

The UK is also a founding member of the Open Government Partnership⁷⁶ (OGP), and is using the OGP action plans to promote values of openness and transparency and foster citizen participation.

UK Policy Lab: Participatory policy co-design

Citizen participation goals in the UK are overseen by an Open Innovation Team⁷⁷ within the Cabinet Office. Open participation in policy formulation is overseen by a sister team, **Policy Lab**. It aims to develop policy in a more open, data-driven, digital and user-centered way and has made available a relevant Open Policy Making Toolkit.

For Policy Lab open policy co-design can help civil service create and deliver policies that are more informed and better designed for both the government and users. It uses:

- collaborative approaches in the policy making process, so that policy is **informed by a broad range of input and expertise** and meets user needs
- analytical techniques, insights and digital tools so that policy is **data driven and evidence based**
- **testing and iteratively improving** policy to meet complex, changing user needs and making sure it can be successfully implemented

(Open Policy Making Toolkit, 2017)

Policy Lab' process steps for policy co-design are:

1. **Diagnosis:** finding the policy problem – This stage is characterized by group work and collaboration across people, departments and organizations and tries to discover the actual users of a service, their journey and needs. The project team is assembled and the key challenge and research questions are defined.
2. **Discovery:** understanding user needs – this stage is used to fill research and knowledge gaps with insight and evidence from user research and data analysis. User needs and

⁷⁵ <https://github.com/>

⁷⁶ <https://www.opengovpartnership.org/>

⁷⁷ <https://openinnovation.blog.gov.uk/>

policy context is narrowed down and a final, concrete project challenge is agreed upon by stakeholders.

3. **Development:** generating ideas - the understanding and insight from *diagnosis* and *discovery* are used to start creating ideas that will answer the needs of users
4. **Delivery: prototyping and improving ideas** testing with users that participated in the co-creation process is carried out. Feedback is received, prototypes are tested again and refined. Untested or experimental prototypes are never released to a large number of users.

Policy Lab uses these tools and acts as a testing ground for policy innovation across government primarily responding to requests from policy teams.

Practical engagement methods and tools

In engaging with potential co-creators the Policy Lab tries to use low cost, of-the-shelf tools. Some of the more relevant that facilitate citizen participation are:

Social media for gathering opinions and advice. Examples include:

- the NHS Constitution consultation used social media to spread the word about changes to the NHS constitution
- the Public Sector Efficiency Challenge used social media and crowd-sourcing to share ideas about where money could be saved across the civil service
- UKTI's Export Jam used social media to ask people what their experience of exporting was and for their ideas to improve it

Journey mapping tools for better understanding a user's experience of a service or policy over a period of time, the interactions and touch or friction points that people have.

Journey mapping can use available online tools such as the [Nesta DIY Toolkit](#) or alternatively simple practical tools for recording a users' experience (for example long rolls of paper, sticky notes, adhesives and marker pens). Participants are asked to describe things in their terms and language. Team members' knowledge is used to create a diagram of a specific user interacting with public or other organization or service over time.

Instances of Policy Lab's include working with civil servants on journey mapping to examine how to better support people who have a health condition and are at risk of leaving work because of it, describing the experiences of people who have been a victim of a crime, and supporting people going through divorce or separation to use mediation services rather than going to court.

Crowdsourcing uses online surveys (e.g. [Survey Monkey](#) or [Google Forms](#)) and social networks to work with large sets of users and experts to get solutions to problems from a more diverse range of individuals with varied skills and experiences. Instances of specialized crowdsourcing tools used by the UK government for particular tasks include:

- Citizen Space was used for the Deputy Prime Minister's Northern Futures project to collect ideas on how to create a new economic hub in the North of England.
- Wordpress platforms have been used by the Department for Business, Innovation & Skills to allow the public to comment on regulations.
- Wazoku has been used The Ministry of Justice, NHS England and the Department for Education to crowdsource ideas.

- Crowdcity is used by the NHS, the third sector and businesses to crowd-source ideas from their employees. This crowdsourcing platform can be used for projects where you want to keep ideas private for an initial period
- The Government Digital Service uses Hackpad/Dropbox Paper to ask the public to discuss design changes.

Classification

e-participation type: e-information & e-consultation.

Co-design and co-production of services and initiatives:

Design: Consultation and ideation | **Execution:** Crowd Sourcing & co-delivery with some instances of self-service | **Monitoring:** citizen reporting with some instances of open book government

Recommendation:

Creating government labs to oversee participation and co-creation efforts can leverage relevant expertise and guide efforts across the civil sector. The UK Policy Lab toolkit is a useful resource that can be used to initiate user need mapping and guide co-design of policies and services.

3.3.2 Spain

Spain concentrated its main citizen e-participation initiatives through the country's national portal administracion.gob.es that includes **legislative deliberation, access to information, feedback mechanisms** and **social media communication channels**. A dedicated transparency portal has also been set up that includes information on **open government initiatives, government budget, procurement, staffing, statistical and contract information**, and supports **Freedom of Information** requests.

Given the country's administrative structure, of particular importance has been the participatory democracy project **Decide Madrid** that was initiated September 2015 by the City of Madrid to enable participatory strategic planning for the municipality. In February 2016, Barcelona – the second largest city in Spain and the capital of Catalonia region – issued their own participatory democracy project decidim.barcelona (“Barcelona we decide”⁷⁸).

Both these projects were based on an open source e-participation platform, **Consul**⁷⁹, that is open source and offered freely. The Consul software offers a ready-made and tested platform that includes modules for citizen proposals, e-voting, participative budgets, and collaborative legislation.

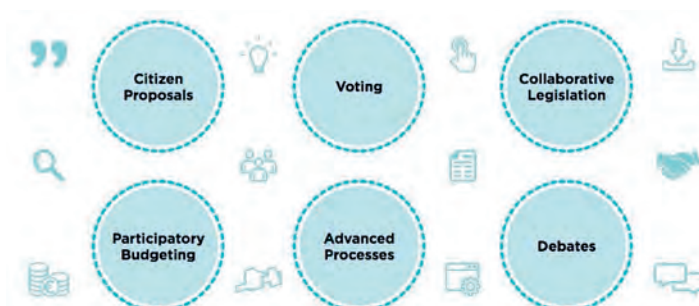


Figure 12 - Participatory Modules of Consul software (source: Consul Dossier 2018)

78 <https://www.decidim.barcelona/>

79 <http://consulproject.org/>

The main modules of the Consul platform allow participation via five subsystems: 1) citizen proposals, 2) online voting, 3) collaborative legislation drafting, participatory budgeting, and 5) debates.

- **Citizen Proposals** allow people to present a proposal to improve their city. The platform can be configured to accept who proposals only buy a subset of individuals (e.g. according to registration status, age etc.) A moderation module is available to avoid offensive content. When a proposal has reached the number of necessary supporters, it goes to a majority vote. The platform supports User verification to avoid duplicate voting and if needed paper ballot voting. Proposers can use an inbuilt notification system, to easily promote their proposals without cost and discuss their ideas in the platforms' comment section.
- **The voting system** supports digital ballot boxes, postal and web votes, user verification to avoid duplicate votes, the option to restrict participation by area/district/neighborhood and a system to establish and organize voting centers and booths, with presence-based or digital voting systems.
- The **collaborative legislation** subsystem enables citizens to actively participate in preparing legislation and action plans. It supports open debates on the most important points of a planned piece of legislation and allows people to prioritize what measures are to be included in the final text. Consul publishes the legislation drafts and gives people the opportunity to comment - using a color-coded system for easier understanding - on specific sections as well as evaluating the comments of others.
- In **Participatory Budgeting** citizens propose and decide how part of an entity's budget is spent. Anyone can make a proposal and vote for the initiatives of others. The organization submitting a portion of its budget for the participatory process can review the proposals and exclude those that do not fall within their competency or are not feasible. all validated proposals along with their respective budgets are made public, so citizens can vote for them. The proposals that receive the most votes are then implemented.



Figure 13 - The participatory budgeting process within Consul (source: Consul Dossier 2018)

- **Debates** allow people to start a discussion thread in an independent area of the website. Political representatives can have verified profiles and there is no limit to the number of comments and debates that can be supported. Comments are nested to facilitate reading and Consul supports the creation of categories, labels, geographic locations, trends and intelligent filters, making tracking easier for commenters and readers alike.

Any local government can contact Decide Madrid's workgroup, known as the Institutional Extension Service, to receive assistance in setting up an instance of the platform. Technical, organizational and even legal help can be obtained through this collaborative process. The platform is now used by 90 local governments in 18 countries and has a very active user community.

Classification

e-participation type: e-information, e-consultation & e-decision making

Co-design and co-production of services and initiatives:

Design: Consultation and ideation with some instances of self-organization | **Execution:** Crowd Sourcing & co-delivery with some instances of ecosystem embedding |

Monitoring: citizen reporting with some instances of open book government

Recommendation

Utilizing existing open source tools and civic participation platforms like Consul that have reached the critical mass necessary to be supported by large implementer and user communities can assist governments in reducing implementation costs and risks.

3.3.3 Finland

Finland developed its current strategy towards civic participation via a succession of long running projects, such as Hear the Citizens project (2000-2005), the Government's Policy Program on Citizen Participation (2003-2007), the Government's Democracy Network (2007- ongoing), and via its joining the Open Government Partnership initiative in 2013. Importantly, Finland set a clear goal to evolve into one the top ten countries in eDemocracy by 2020, produced the relevant policy documents and allocated research funds for the promotion of openness and citizen participation. The Ministry of Finance launched an action development program (2011 -2015) on eServices and eDemocracy (SADe) in order to develop comprehensive e-services for citizens, companies and authorities and create state of the art eDemocracy tools.

The resulting Finnish eDemocracy platform demokratia.fi groups participation efforts under thematic categories that each are given their own sub-site with relevant functionalities:

- Citizens proposals, local issues and initiatives – kuntalaisaloite.fi
- Proposing legislation and citizen declarations - kansalaisaloite.fi
- Youth participation and inclusion - nuortenideat.fi
- Online discussion - otakantaa.fi
- Deliberation on government proposals - lausuntopalvelu.fi

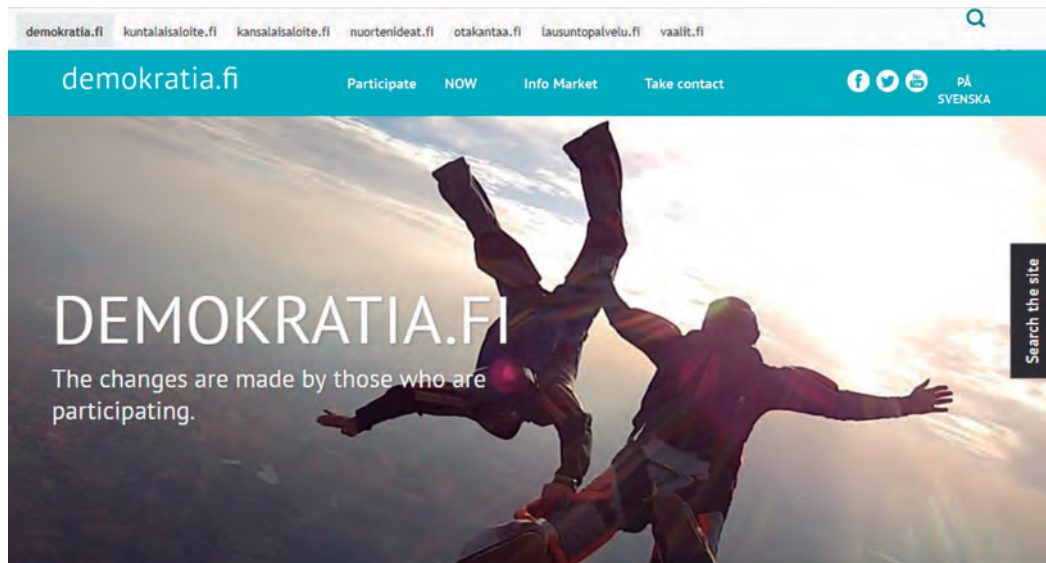
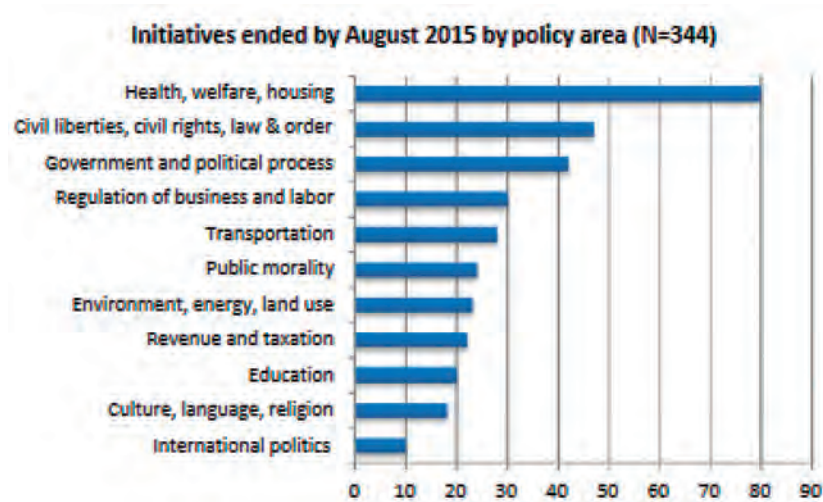


Figure 14 - The demokratia.fi landing page

The most innovative of these efforts is the kuntalaisaloite.fi citizen proposal site. Since 1 March 2012, the Finnish Constitution allows citizens to put forward a legislative initiative if a number of 50000 signatures is achieved. Article 53 in the Constitution defines the right for citizens to make law proposals which will be discussed and voted on by the parliament. This can significantly reduce costs for citizens initiating legislation since it becomes possible for smaller and marginalized civic groups to reach the signatures required to support their political and societal causes.

Finland is one of very few countries that allow online digital signatures in national level citizens' initiatives (Christensen et.al., 2016). Online signature collection of signatures enhances the accessibility of the platform and its participatory component from the citizens' perspective.

The tool has been quite popular, and a wide variety of political issues and causes have been raised.



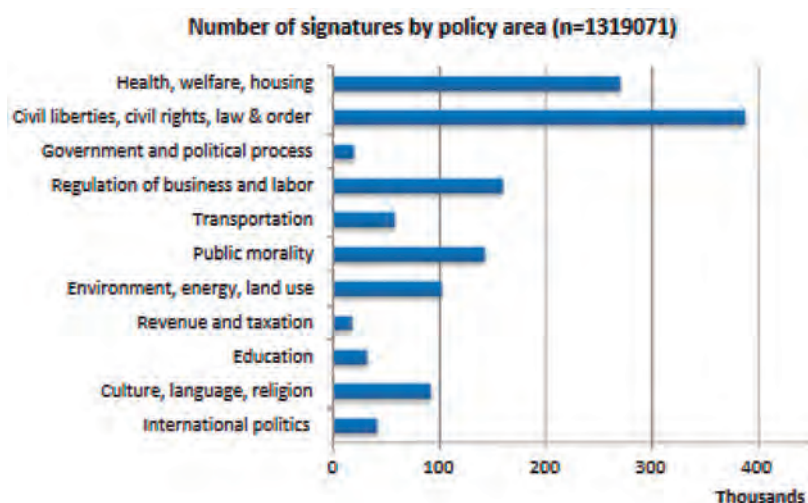


Figure 15 – Participation types and levels in Finish Citizens Initiatives (Source: Christensen et.al., 2016)

Despite the fact that only 3% of the launched initiatives have succeeded in collecting the required number of signatures there is a very high level of satisfaction with the citizens’ initiative, as a vast majority believes that it has had a positive impact on Finnish democracy (Christensen et.al., 2016)

Aim	Date collection started	Number signatures	of Plenary decision	Plenary votes	Date of decision (1st reading)
Ban fur-farming in Finland	13.05.2012	69,381*	Rejected	36-146	13.06.2013
A fairer copyright legislation	23.01.2013	51,801	Rejected	27-147	24.10.2014
Make Swedish voluntary subject in schools	04.03.2013	61,306	Rejected	48-134	06.03.2015
Gender neutral marriage legislation	19.03.2013	166,851	Approved	105-92	28.11.2014
Energy certificate for houses	11.04.2013	62,211	Rejected	NO VOTE	10.06.2014
Harder punishment for drunk driving	17.08.2013	62,835	Rejected	NO VOTE	10.03.2015
Change laws for child delivery hospitals	10.04.2014	66,797	Rejected	33-139	27.11.2015
Right for nursing staff to refuse to assist in terminating life	23.05.2014	67,547	Rejected	33-136	04.12.2015

*The collection of signatures started before the launch of www.kansalaisaloite.fi so most signatures were collected on paper.

Figure 16 - Outcomes for citizens initiatives (Christensen et.al., 2016)

Classification

e-participation type: e-information, e-consultation & e-decision making.

Co-design and co-production of services and initiatives:

Design: Consultation and ideation with some instances of self organization | **Execu-**

tion: Crowd Sourcing & co-delivery with some instances of ecosystem embedding |

Monitoring: citizen reporting with some instances of open book government.

Recommendation

It is important that online citizen participation is understood and realized as a true component of the democratic and participatory process. It is useful for such projects to be designed and implemented not simply as an e-government project but as equal access and direct democracy projects.

When using central online participation portals grouping the information along thematic axes and making sure all citizens groups (e.g. youth, minorities, senior citizens) are represented significantly aids the participatory process.

3.3.4 Canada

The government of Canada has set up a central reporting website⁸⁰ to facilitate citizen access to information. It includes the proactive disclosure of specific classes of expenses, general government spending both actual and planned, anticipated regulatory changes, audit and evaluation results and administrative burden baseline counts. The website also displays result of Freedom of Information request.

Canada is also using an Open Government portal that includes information on OGP action plans and commitments and availability of open data. This portal additionally offers ways to participate in government policy and program development and explore resources to support effective public engagement through its Open Dialogue component. Citizens can participate in legislative consultations, while students, academics and federal, provincial, territorial and municipal public servants can use the GCcollab collaboration platform.

GCcollab.ca, grew out of an open-source communication interface that government employees had been using for years. The service allows academics to connect and network with their research or policy counterparts within public sector. They can also utilize it to help keep curriculum up-to-date, based on real-world practices within Canada's governments. Students can ask questions to support their work and research while public servants can leverage it to identify talent, support their on-going research, find their subject-related counterparts, or supplement public consultation processes.

The government is also facilitating the Government of Canada Developers Exchange (**GC DevEx**⁸¹) a website designed to make it easier to collaborate on open source digital solutions. Teams within the Government of Canada can post contract opportunities for developers.

Canada has also committed itself via its third OGP action plan to promote common principles for open Dialogue and common practices across the Government of Canada to enable the use of new methods for consulting and engaging Canadians.

To do so it will embark on an exercise to Identify necessary support (e.g. skills development, resourcing, technological innovation) needed to deliver on the full potential of engaging with all stakeholders. It will also aim to Identify and support participatory processes undertaken by departments to share lessons learned and demonstrate the value of including stakeholders and members of the public throughout the policy, program or service design and implementation.

These initiatives are part of Canada's extensive open government efforts. Canada has assumed the co-chairmanship of OGP and will be hosting the Open Government Partnership (OGP) Global Summit in 2019. Canada's priorities for the Global Summit 2019 include enabling citizens, civil society and businesses to participate in government decision-making since it is viewed that this leads to more trust in government and better outcome. During its OGP chairmanship mandate Canada will also try to focus its own and other members' efforts to empower under-represented citizens, regardless of gender, race, or sexual orientation, to engage actively with governments.

80 <https://www.canada.ca/en/transparency/reporting.html>

81 <https://gcdevexchange-carrefourproggc.org/en>

Classification

e-participation type: e-information & e-consultation.

Co-design and co-production of services and initiatives:

Design: Consultation and ideation with some instances of nudging | **Execution:** Crowd Sourcing & co-delivery | **Monitoring:** citizen reporting

Recommendation

Taking advantage of already existing structures such as the Open Government Partnership OGP can leverage citizen participation via the bi-annual OGP action plans. It also enables peer to peer exchanges and sharing of best practices between participating countries.

3.3.5 Singapore

Singapore offers perhaps the clearest example of a country that has selected to unify all of its e-participation efforts under one online portal, www.reach.gov.sg. REACH (reaching everyone for active citizenry @ home) is the lead agency in facilitating Whole-of-Government efforts to engage and connect with citizens, on national and social issues.

It has its roots in an effort began as the Feedback Unit in 1985 tasked with gathering public feedback. In 2009, REACH was redesigned to become Singapore Government's e-engagement platform. Its main aims are to gauge ground sentiments, engage citizens through multiple feedback channels and promote active citizenry. For this REACH includes modules for feedback provision, online discussion, participatory budgeting, public consultation, e-polls and a model parliament. REACH facilitates communication between Singaporeans and Government agencies by proactively initiating discussions on various topics and in response gathering feedback on policy issues. REACH then informs the relevant Government within three days of any available comments. After assessment feedback is provided by each relevant agency.

Such developments in Singapore were made possible through careful planning and long-term strategies such as the Infocomm Development Authority (IDA)'s 10-year masterplan iN20156 and the eGov2015 masterplan (launched in 2011). The eGov2015 masterplan's vision was "to be a Collaborative Government that Co-creates and Connects with Our People" indicating a clear commitment by the Government in adopting a collaborative approach to public service delivery.

The masterplan identified three areas of action: **co-creating for greater value, connecting for active participation, catalysing whole-of-government transformation** (Infocomm Singapore, 2013).

Agencies who wish to use REACH and can seek consultation to help adoption and are provided with examples of best practices. They are also actively encouraged to use popular social media tools and channels such as Facebook, YouTube, Twitter and LinkedIn to connect with the public. IDA also has a citizen engagement program to provide consultation services to agencies for the harnessing of social media and crowdsourcing tools. Innovation workshops are offered to spark new perspectives and innovation to better engage citizens using social engagement technology.

Seamless Experience In Making Tax Payments (for taxpayers who are not on GIRO)

Description:	Through this short poll, we hope to find out more about how to make paying taxes a breeze for you. It will take only approximately 1 minute to complete this poll. We appreciate your input and welcome your opinion!
Ministry:	Inland Revenue Authority of Singapore
E-Poll Period:	02 May 2018 - 30 Sep 2018
Status:	Open

[Bookmark](#)

Through this short poll, we hope to find out more about how to make paying taxes a breeze for you. It will take only approximately 1 minute to complete this poll. We appreciate your input and welcome your opinion!

1. How do you know how much income tax payment you need to make to IRAS?

Physical Bill and / or the letters IRAS sent

SMS alert

Log in to myTax Portal

By memory

Others (please specify)

Please specify if you selected "Others":

2. Do you expect the outstanding tax balance to be displayed on the payment platforms such as AXS and SAM when you are making payment?

Yes

No (please state your reason(s))

Reason(s) for selecting "No":

Figure 17 - Example of quick e-poll on the REACH platform

New services are prototype using agile development methods to speed up their delivery and maintain their relevance.

Success of the REACH platform in Singapore should also be attributed to the very high penetration of mobile technology (smartphones, high speed mobile internet) in Singapore today. This fact was acknowledged by the Government which provided innovative and engaging crowdsourcing tools via mobile apps to allow citizens to provide feedback to improve their living and working environment quickly and conveniently.

Classification

e-participation type: e-information & e-consultation.

Co-design and co-production of services and initiatives:

Design: Consultation and ideation with some instances of nudging | **Execution:** Crowd Sourcing & co-delivery | **Monitoring:** citizen reporting

Recommendation

Long term planning and whole-of government approaches significantly aid meaningful citizen participation. Establishing central agencies that are responsible for citizen feedback and participatory process adoption and co-ordination can improve feedback quality, relevance and utility.

3.3.6 Italy

Italy has in recent years tried to form a lead in open and participatory government initiatives. Some of its main e-participation efforts, its public consultations as well as its OGP action plan commitments are available through the open.gov.it website.

A unique and innovative e-participation initiative is the **Transparency Compass** system and website. It is an automated online instrument that gives citizens the possibility to monitor in real time the implementation of all data and information requirements imposed by Italian law on the websites of more than 20,000 Italian public administrations.

At its heart the system is a validation mechanism with the ability to analyze public administration websites in both real-time and at specific intervals. The analysis is performed by comparing the found data and information with contents defined and standardized by the laws of transparency and guidelines on websites.

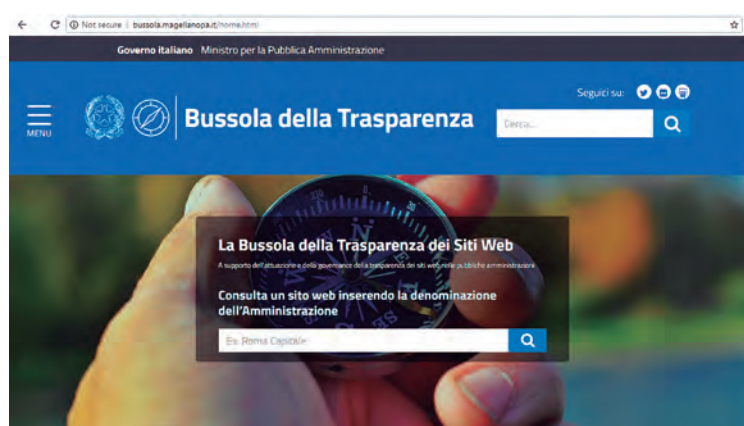


Figure 18 - Landing page of Transparency Compass website

The Transparency Compass contains a set of ranking features to push administrations to become more transparent and improve performance. Through its graphic dashboard functionality citizens, researchers and journalists can perform real-time monitoring of how the transparency process is proceeding at national and regional level.

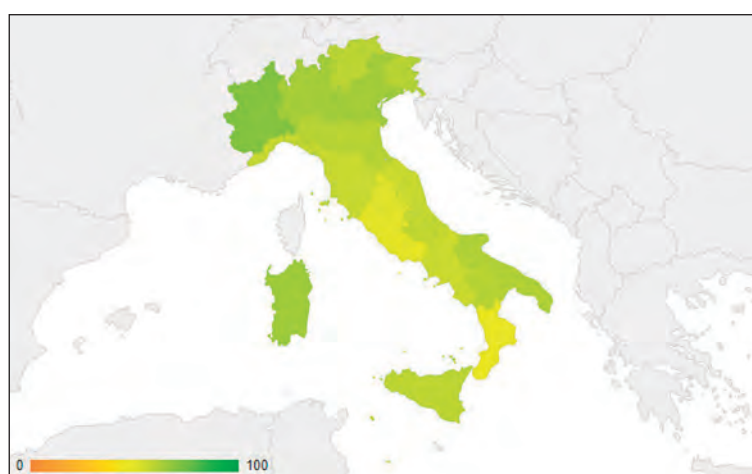


Figure 19 - Percentage of transparency requirements fulfillment per region (source Transparency Compass - 2018)

Importantly citizens can also log into the Compass via a social network login (Facebook, LinkedIn, Twitter, Google+) and express anonymously opinions about the quality of the published data and information.

Classification

e-participation type: e-information & e-consultation.

Co-design and co-production of services and initiatives:

Design: Consultation and ideation | **Execution:** Crowd Sourcing | **Monitoring:** self-monitoring and citizen reporting

Recommendation

Adoption of dashboards application such as the Transparency Compass for presenting sometimes complex government information on activities and services can improve citizen participation and reporting as well as foster competition between the participating entities.

3.3.7 New Zealand

The country's e-participation efforts are available through its main government portal digital.govt.nz. The engagement efforts include consultation listings, information requests and feedback mechanisms. Additionally in 2016–2017, the Department of Internal Affairs developed and tested a Government Online Engagement Service (GOES) tool that allowed agencies to set up and manage online consultations, which were hosted on Govt.nz.

To date the initiative has delivered:

- the [all-of-government consultations listing](#) (on Govt.nz)
- the [online engagement guidance](#) (on webtoolkit.govt.nz)
- an online engagement community (now disbanded)
- a pilot for a minimum viable product (MVP) survey tool

In 2017, following the GOES pilot, the Department of Internal Affairs ran a 6-week research project focused on ways that digital can support participation in government to enable people, business and communities to have insight into and be involved in government decision making. As a result it drafted a set of participation principles to support a more flexible and open government culture and more investment in relationships that can assist co-creation and co-design with New Zealanders.

Agencies felt that GOES expertise removed some of the risk of using digital tools (e.g. security and web accessibility standards, assisted with plain language instruction, user-experience design and helped by using Govt.nz, which was ideal for multi-agency consultations that couldn't be hosted on a single agency website.

The NZ government itself feels that participatory tools like online consultations lead to higher quality policy options, informed by a greater understanding of participants' needs. also help in reducing political and operational risk, by 'road-testing' policy options, and engaging with the public during the design process.

Significantly this research led to valuable conclusion for removing barriers to participation especially when using online consultations and survey tools. The GOES pilot evaluation found that there is clear evidence, both local and international, that consultations with easy to understand and well-structured information, increase participation for people as well as enable government transparency. Consultations that use quantitative questions

and present their information on clear sections make it easier and faster for people to submit their feedback.

It must be considered that survey tools are an example of 1-way communication system and do not necessarily facilitate a 2-way conversation, enabling people to have their say on issues that matter to them. When designing consultation governments should be cognizant to take proactive steps to ensure diversity of opinion.

Similar to the UK the NZ government also offers a comprehensive Web Toolkit that provides standards, guidance, tips, and strategic advice on effectively using the online channel including online engagement strategies. The New Zealand example illustrates that the UK model can be replicated with some success and can be a valid starting point for citizen e-participation efforts.

Classification

e-participation type: e-information & e-consultation.

Co-design and co-production of services and initiatives:

Design: Consultation and ideation | **Execution:** Crowd Sourcing & co-delivery with some instances of self-service | **Monitoring:** citizen reporting with some instances of open book government

Recommendation

Participation efforts themselves should be submitted to peoples review and examination and should be co-created through citizen feedback. Meaningful engagement with citizens should avoid taking the form of “arms-length instruments such as surveys.

3.3.8 Open Government Partnership

OGP was launched in 2011, (Brasil was one of its co-founders) to provide an international platform for domestic reformers committed to making their governments more open, accountable, and responsive to citizens. To become a member in OGP, participating countries must endorse a high-level Open Government Declaration⁸², deliver a country action plan developed with public consultation, and commit to independent reporting on their progress going forward. At the time of writing 79 countries and 20 local governments are engaged in the OGP process.

What is of particular interest with the OGP process are the co-creation requirements that are a part of action plan creation and are available by default to countries that are a part of OGP.

OGP aims to secure concrete commitments in bi-annual national action plans (NAPs) from governments to promote transparency, empower citizens, fight corruption, and harness new technologies to strengthen governance.

The NAP ideally begins with several rounds of open consultation, in which all interested parties are invited to present and discuss ideas for commitments with input from both civil society and different government departments. OGP encourages countries to develop a permanent dialogue mechanism between government and civil society so that they actively collaborate throughout the full national OGP cycle: first by co-creating the action plan, then by supporting and carrying- out implementation, and finally by monitoring and evaluation.

The main objective of OGP is to promote effective collaboration between governments

⁸² <https://www.opengovpartnership.org/about/open-government-declaration>

and civil society organizations facilitating the development and implementation of national open government reforms. OGP-participating countries work in a two-year National Action Plan (NAP) calendar cycle. The cycle, based on specific standards that are provided by OGP (OGP, 2017), includes developing, implementing, monitoring and reporting on a National Action Plan. A key challenge in the OGP process is to empower participation of government officials, civil society, other stakeholders and any interested parties. It also aims to provide the mechanism and technology tools that enable all parties to actively participate in all steps of the two-year action plan cycle. Such mechanisms cover the whole action plan cycle and include the establishment of participatory processes for proposing national commitments, agreeing on the commitments to be included in the NAP and participating in the evaluation of the NAPs.

The OGP evaluation process is comprised of two separate activities; progress reports that are produced by country local researchers working for the Independent Reporting Mechanism of the OGP and self-assessment reports produced by the participating governments.

OGP's Participation and Co-creation Standards set out requirements for engaging civil society, citizens, and other stakeholders throughout the OGP process. These standards also guide the content to be included in Self-Assessment Reports. These include the following areas:

- **Feedback mechanisms:** A key requirement for the engagement of the public, civil society and other relevant stakeholders in the NAP self-assessment is to provide them with timely information about the process and give feedback on how their inputs are taken into account.
- **Space for co-creation:** Governments also need to provide spaces and platforms for dialogue and co-creation to facilitate an inclusive dialogue on the assessment of the NAP.
- **Facilitating a multi-stakeholder Forum:** A key requirement of the Participation & Co-creation Standards is the establishment of a multi-stakeholder forum to coordinate and oversee the OGP process. The main contribution of such a forum is to build collaborative relationships and establish mutual understanding and expectations but also to secure broad ownership of the process and the NAP. While taking relevant measures to ensure an inclusive collaboration environment, governments also need to include a two-week public consultation period during the development of the Self-Assessment Report.

OGP uses the International Association for Public Participation's (IAP2) "Participation Spectrum" to define the levels of citizen participation in developing an open government action plan. The spectrum's participation levels are (OGP Participation Toolkit, 2017):

- **Inform** — government keeps civil society informed.
- **Consult** — government keeps civil society informed, listens to and acknowledges concerns and aspirations, and provides feedback on how public input influenced the decision. They seek feedback on drafts and proposals.
- **Involve** — government works with civil society to ensure that their concerns and aspirations are directly reflected in the alternatives developed and provides feedback on how public input influenced decisions.
- **Collaborate** — government works together with civil society to formulate solutions and incorporates advice and recommendations into the decisions to the maximum extent possible.
- **Empower** — government and civil society make joint decisions

An overview of IAP2 Core Values and principles of good engagement are presented below:

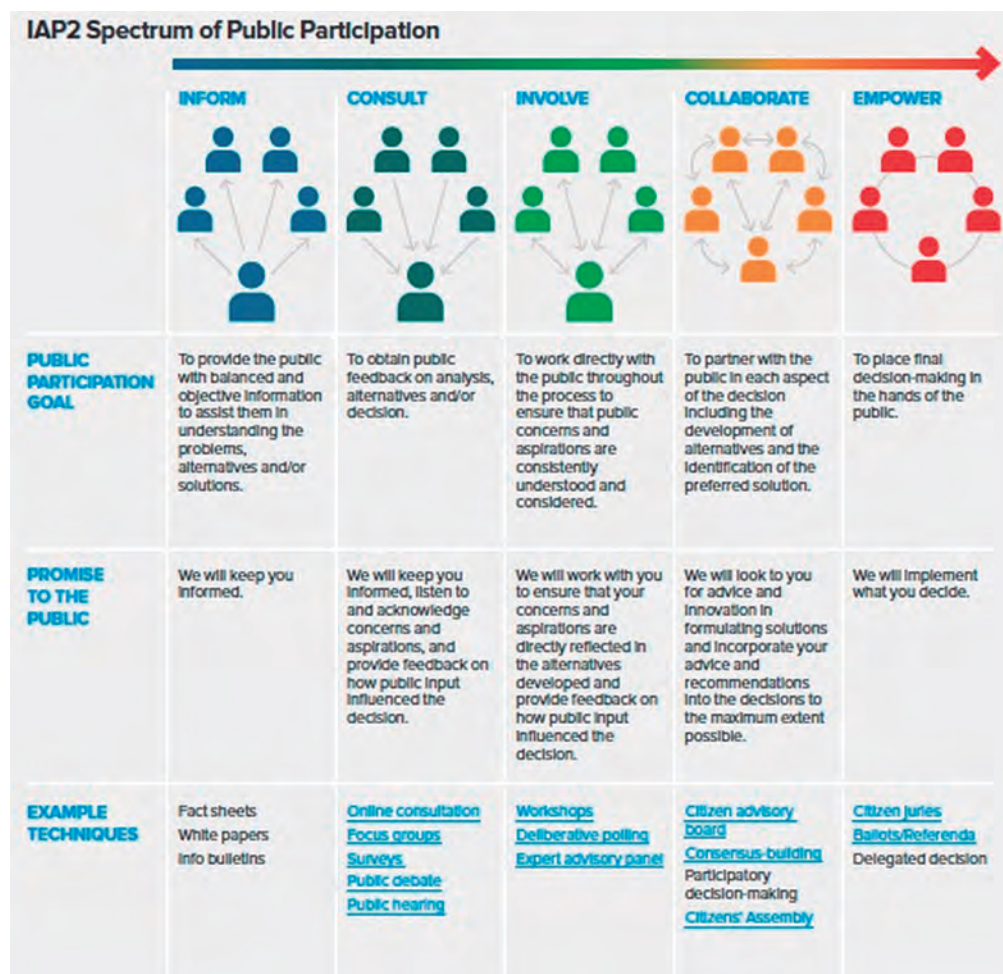


Figure 20 - IAP2 Spectrum of Public Participation (source: OGP Participation Toolkit)

Based on these IAP2 core values OGP main guiding principles of participation endeavors are:

- Public participation is based on the belief that those who are affected by a decision have a right to be involved in the decision-making process.
- Public participation includes the promise that the public's contribution will influence the decision.
- Public participation promotes sustainable decisions by recognizing and communicating the needs and interests of all participants, including decision makers.
- Public participation seeks out and facilitates the involvement of those potentially affected by or interested in a decision.
- Public participation seeks input from participants in designing how they participate.
- Public participation provides participants with the information they need to participate in a meaningful way.
- Public participation communicates to participants how their input affected the decision.

To support and facilitate these values and principles process OGP has overarching elements of dialogue:

- Dissemination of information - Provide the public, civil society, and other relevant stakeholders with timely information about all aspects of the OGP process, including feedback on how their inputs are taken into account.
- Spaces and platforms for dialogue and co-creation — Facilitate an inclusive and ongoing dialogue using a variety of spaces and platforms appropriate to the context.
- Co-ownership and joint decision making — Government, civil society, and other stakeholders should jointly own and develop the process.

OGP manages to maintain these participation standards via a multi-modal review and assessment framework. The OGP evaluation process is comprised of two separate activities; progress reports that are produced by country local researchers working for the Independent Reporting Mechanism of the OGP and self-assessment reports produced by the participating governments.

The primary tool in evaluating OGP Action Plans implementation are the two reports produced by the Independent Reporting Mechanism (IRM) of OGP for each two-year action plan cycle, one at midpoint and one on completion. The progress reports present the results of assessing governments on the development and implementation of OGP action plans and on their progress in fulfilling open government principles and make technical recommendations for improvements (OGP, IRM Procedures Manual, 2017). Reviewing the government progress is based on a consultative process with government, civil society, and the private sector.

The first progress report is produced at the end of the first year of implementation (IRM progress report) and aims to assess governments on the development and implementation of OGP action plans and progress in fulfilling open government principles and make technical recommendations for improvements. The second progress report is produced at the end of the two-year implementation cycle (IRM end of term report). The end of term report assesses completion at the end of the action plan cycle as well as any changes to government openness during the implementation period.

Apart from the annual independent progress reports, the IRM also releases, in open formats, the underlying data for those reports (OGP, Explorer and IRM data) and technical papers, analyses, and syntheses of any cross-cutting themes and findings. (OGP IRM, 2014).

Governments also need to complete two Self-Assessment reports for each action plan: one after the first year of implementation, and one upon completion of the two-year cycle. The first year Self-Assessment reflects on the NAP drafting process, while the second year focuses on the implementation of the NAP. OGP is also assessing the quality of each NAP and the effectiveness of its implementation (OGP, 2017). The two Self-Assessment Reports are differing primarily in the time period covered and complement each other. The midterm self-assessment focuses on the development of the NAP, the consultation process, the relevance and ambitiousness of the commitments, and progress to date. The end-of-term self-assessment focuses on the final results of the reforms completed in the NAP, consultation during implementation, and lessons learned.

Classification

e-participation type: e-information, e-consultation & e-decision making.

Goals if Open Government declaration principles are implemented fully:

Co-design and co-production of services and initiatives:

Design: Consultation and ideation with strong instances of self-organization | **Execution:** Co-delivery with many instances of ecosystem embedding and significant in-

stances of self-service | **Monitoring:** Open book government and extensive self-monitoring

Recommendation: Using OGP monitoring and evaluation tools to maintain quality of citizen participation initiatives. The OGP Participation and Co-creation Toolkit⁸³ can be a guide for designing and implementing citizen participation efforts

3.4 Comparison and recommendations

By examining the efforts of countries that perform highly in e-participation efforts a number of common threads begin to emerge. These include a commitment to effective citizen participation as a democracy project and not just a technological one, significant efforts to include marginalized sections of the population and using in many cases simple and openly available tools to support their efforts. Whole of government approaches and creation of specialized agencies to facilitate online participation are also common. Most high performing countries are also actively engaged in international initiatives such as the Open Government Partnership utilizing the experience and knowledge of other countries sharing the same goals.

All country best practices presented offer e-information and e-consultation opportunities, while true e-decision making is a rarer occurrence (as in Finland and Spain). In terms of initiative and service co-design most efforts are geared towards consultation of citizens and involving them in sharing ideas. Execution of initiatives in most cases involves crowdsourcing with some co-delivery. Monitoring usually involves citizen reporting (Table 6).

Table 5: Categorization of e-participation best practices

Country or Case	Civic engagement site(s)	EPI	Linders typology of initiatives and services co-production
UK	gov.uk	e-information e-consultation	Design: Consultation and ideation Execution: Crowd Sourcing & co-delivery with some instances of self-service Monitoring: citizen reporting with some instances of open book government
Spain	transparencia.gob.es/ and the Consul Platform	e-information e-consultation e-decision making	Design: Consultation and ideation with some instances of self organization Execution: Crowd Sourcing & co-delivery with some instances of ecosystem embedding Monitoring: citizen reporting with some instances of open book government
Finland	www.demokratia.fi	e-information e-consultation e-decision making	Design: Consultation and ideation with some instances of self organization Execution: Crowd Sourcing & co-delivery with some instances of ecosystem embedding Monitoring: citizen reporting with some instances of open book government
Canada	open.canada.ca/en/open-dialogue www.canada.ca/en/transparency/reporting.html	e-information e-consultation	Design: Consultation and ideation with some instances of nudging Execution: Crowd Sourcing & some co-delivery Monitoring: citizen reporting
Singapore	www.reach.gov.sg/	e-information e-consultation	Design: Consultation and ideation with some instances of nudging Execution: Crowd Sourcing & some co-deliver Monitoring: citizen reporting
Italy	Open.gov.it and bussola.magellanopa.it/home.html	e-information e-consultation	Design: Consultation and ideation Execution: Crowd Sourcing Monitoring: self-monitoring and citizen reporting

83 https://www.opengovpartnership.org/sites/default/files/OGP_Participation-CoCreation-Toolkit_20180509.pdf

Country or Case	Civic engagement site(s)	EPI	Linders typology of initiatives and services co-production
New Zealand	www.digital.govt.nz/	e-information e-consultation	Design: Consultation and ideation Execution: Crowd Sourcing & some co-delivery with some instances of self-service Monitoring: citizen reporting with some instances of open book government
OGP best practices	OGP Participation and Co-creation toolkit	e-information e-consultation e-decision making	<i>Goals if Open Government declaration principles are implemented fully:</i> Design: Consultation and ideation with strong instances of self organization Execution: Co-delivery with many instances of ecosystem embedding and significant instances of self-service Monitoring: Open book government and extensive self monitoring

The examples of best practices analyzed suggest a number of recommendations for improving designing and implementing e-participation initiatives. We summarize below the recommendations identified in the analysed cases:

- REC. 1 It is important that online citizen participation is understood and realized as a true component of the democratic and participatory process. It is useful for such projects to be design and implemented not simply as an e-government project but as equal access and direct democracy projects.
- REC. 2 Long term planning and whole-of government approaches significantly aid meaningful citizen participation. Establishing central agencies that are responsible for citizen feedback and participatory process adoption and co-ordination can improve feedback quality, relevance and utility.
- REC. 3 Participation efforts themselves should be submitted to peoples review and examination and should be co-created through citizen feedback. Meaningful engagement with citizens should avoid taking the form of "arms-length instruments such as surveys.
- REC. 4 Taking advantage of already existing structures such as the Open Government Partnership OGP can leverage citizen participation via the biannual OGP action plans. Using OGP monitoring and evaluation tools to maintain quality of citizen participation initiatives. The OGP Participation and Co-creation Toolkit can be a guide for designing and implementing citizen participation efforts.
- REC. 5 Creating government labs that oversee participation and co-creation efforts can leverage relevant expertise and guide efforts across the civil sector. The UK Policy Lab toolkit is an extremely useful resource that can be used to initiate user need mapping and guide co-design of policies and services.
- REC. 6 When using central online participation portals grouping the information along thematic axes and making sure all citizens groups (e.g. youth, minorities, senior citizens) are represented significantly aids the participatory process.
- REC. 7 Adoption of dashboards application for presenting sometimes complex government information on activities and services can improve citizen participation and reporting as well as foster competition between the participating entities.
- REC. 8 Utilizing existing open source tools and civic participation platforms like Consul that have reached the critical mass necessary to be supported by large implementer and user communities can assist governments in reducing implementation costs and risks.

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4 Advanced technologies for service platforms

Conduct a survey of the best technologies used in service platforms that make the user experience easier to use, considering language, interface, information architecture, layout proposals, communication and push mechanism, service evaluation, and usability. In addition, consider the provision of interinstitutional services.

4.1 Introduction

In this part of the survey, we try to identify technologies used in the service platform for providing a rich user experience, considering language, interface, information architecture, layout proposals, communication and push mechanism, service evaluation, and usability.

4.2 Platforms included in the analysis

The list of the eGovernment service portals we analyze in this section appears on the table below. These are eight national service portals in total. Five of them are the same service portals selected for analysis in section 2 of the current document. Additionally, we analyzed three more national service portals, namely USA, UAE and New Zealand. All these portals are chosen from the top ranked countries in the 2016 UN Survey using the Online Service Index and satisfy the criteria presented in section 2. On the following table, we mention the country name and we provide the site URL.

Table 6: Platforms analysed for UI good practices

No.	State	URL (universal resource locator) pf service portal
1	Australia	https://www.australia.gov.au/
2	Finland	https://www.suomi.fi/frontpage
3	Estonia	https://www.eesti.ee/en/
4	Canada	https://www.canada.ca/en/services.html
5	USA	https://www.usa.gov
6	UK	https://www.gov.uk
7	New Zealand	https://www.govt.nz
8	UAE	https://www.government.ae/en/information-and-services#/

4.3 Methodology and portals assessment

To deal with the technologies and various aspects of the platforms/portals under investigation, we drafted an assessment model. The model derived from the requirements of the specific section, relevant literature and the experience of the expert.

The model takes the form of a simple set of 23 check-points. The instrument may be also used as a basis for self-evaluation of websites by agencies. It includes explanations of the check-points, and advice on how to determine the needed information from the sites. We briefly explain what each check-point is concerned with.

The model is inspired by various assessment models used in eGovernment like IMAPS⁸⁴. Thus, we evaluate each area with an integer number representing the number of criteria the service portal fulfills. For instance, if UK's portal fulfills in UI/UX area two of the criteria gets a score of 2. Then, this is multiplied by the weighting factor of this category i.e. for UI the weight is 15%. For our case that is $2 * 15\% = 0.3$. All weighted criteria sum up to the total of grading achieved by a governmental site, in this case the sum is 2.98.

Table 8 provides the analysis of technology and platforms, where results are presented in descending order of the total column. Notice that values in the "Communication and push mechanisms" column are pre-calculated float numbers. This is because they are already calculated according to a model applied and explained in section 5.

In the text descriptions of the model, any exceptional and worth mentioning solution applied upon the service portals is identified and organized in a "quick-win" guide focusing on best practice recommendations.

We utilized some tools for the assessment: Wappalyzer⁸⁵ to analyze technology on relevant service portals; Netmechanic⁸⁶ to monitor broken links in the HTML code of the portals, the W3C's HTML validator⁸⁷ to validate the HTML code of the portals, the Web Content Accessibility Guidelines (WCAG) 2.0⁸⁸ as a standard set of accessibility rules.

We group the factors that influence the quality of government websites into six major categories: (1) User experience; (2) Architecture; (3) Communication; (4) Service evaluation; (5) Usability; and (6) Interinstitutional support. For example, category of usability focuses on whether a government agency's website is accessible to different levels of user capability. Therefore, the usability category contains questions evaluating disability access to the website. The user friendliness of the website is observed by looking at factors such as the presence of help pages, whether the site is available in more than one language, etc.

We have included the following evaluation areas along with their basic criteria.

1. **User experience, user Interface (UI/UX):** this axis includes assessment of specific aspects of portals' layout, focusing on:
 - a. Clear layout
 - b. Responsive design and mobile support
 - c. Font sizing/flexibility, language support
 - d. Other media and/or audio support

84 Interoperability Maturity Assessment, https://ec.europa.eu/isa2/solutions/imaps_en

85 Wappalyzer, <https://www.wappalyzer.com/>

86 NetMechanic, <http://www.netmechanic.com>

87 <https://validator.w3.org/>

88 Web Content Accessibility Guidelines (WCAG) 2.0, <https://www.w3.org/TR/WCAG20/>

2. **Architecture** used for the service platform including:
 - a. Well-known, supported and stable software used for server (e.g. Apache on Ubuntu)
 - b. Well-known, supported and stable software used for the platform (e.g. Drupal)
 - c. Open source vs proprietary orientation
3. **Communication and push mechanisms** used by the national service portal. In this section a summary of results is presented, as this area is further analyzed in the next chapter (i.e. chapter 5). This area deals with the following factors:
 - a. Unique identification of the portal user
 - b. Communication channels supported (whether digital or not)
 - c. Social media integration
 - d. Push vs pull mechanism, e.g. support of alerts/notifications)
 - e. Support provision, e.g. helpdesks, chat tools etc.
 - f. Provision of an e-letter box account for the user
4. **Service evaluation from the users** of the portal including:
 - a. Identifying any type of feedback mechanism available to the users that the portal provides
 - b. Identifying mechanisms that take into account feedback from the user (citizens/businesses). For example, a site could inform users that 20% of the users have voted that X service has to be changed in Y aspect. This is usually achieved by on-line polls.
 - c. Analyzing available data (if any) concerning the service portal evaluation from user (citizen or business) perspective. For example, a site may inform users that the mean delivery time of the service is X, thus setting the users' expectation at the right level.
5. **Usability** of the portal focusing on the following:
 - a. Accessibility issues
 - b. User-friendliness
 - c. Easy finding a service and its description. Organization of services under categories similar to the idea of life-events increases easy service discovery and therefore user satisfaction.
 - d. Friendly, quick, and simple browsing through service portal content. For instance, provision of service metadata and facilitation of search under various facets.
 - e. Deep (versus shallow) content organization. By "deep" we refer to portals that maintain a wealth of information in their own domain, while "shallow" portals are actually light catalogues (aka yellow pages, registries) that provide supportive information and links to other websites where the actual information about the services exist.
6. **Interinstitutional services** focusing on:
 - a. Making service execution transparent, especially when the delivery of a service involves more than one department that should collaborate.
 - b. Providing information about which connections and dependencies of a service to other services exist. A way to provide such information is through the service descriptions where links between services, or links between services and the life-events become explicit, documented and explained.
 - c. Providing information and links from a service to other related items, life-events, costs, duration of service accomplishment and in general relevant data/information that may be involved in the service's execution.
 - d. Transactional execution model. There are several eservice portals that act

as simple information providers to the users, while there are other portals that execute services in an interactive mode (transactional).

Table 7: Analysis of technology and platforms (results are presented in descending order)

Portal Grading → Weights →	UI/UX 0-4 15%	Architecture 0-3 15%	Com 0-3 20%	Service 0-3 15%	Usability 0-5 20%	Interinstitutional 0-4 15%	Total 100%
UAE	3	3	2,75	3	3	4	3,1
UK	3	2	2,4	2	5	3	2,98
Estonia	3	2	2	1	5	4	2,9
Finland	3	1	1,8	2	5	4	2,86
Canada	2	2	1,9	2	5	3	2,73
Australia	3	3	2,2	1	4	2	2,59
USA	3	2	2,2	1	3	2	2,24
New Zealand	1	1	0,6	1	1	1	0,92

4.4 Technology summaries per portal

In this part, we include a summary from the assessment of each separate analysed platform.

4.4.1 UK

UI: Simple and friendly UI, no full support for mobile devices with JavaScript based framework. While the main site is mobile friendly, the portal pages that handle user login are not.

Architecture: The portal is not using any known open source tool to build the main Content Management System (CMS), however it is built on open technologies (NGINX server, jQuery JavaScript framework).

Communication: Only digital communication is supported with no real support of physical support. When starting a service, a new kind of interface appears obviously revealing other platforms connected to the central portal. There is access to a personal e-letterbox as an option.

Service evaluation: There are feedback questions for every page and extensive use of web analytics to track customer behavior. The results of data collected are obviously taken as input as they are at real-time provided through specific performance dashboards⁸⁹.

Usability: Good use of metadata accompanying a service, search facility, simple way of navigation for locating services and organized under specific classes resembling life-events for citizens and business events for business users.

89 <https://www.gov.uk/performance>

Interinstitutional: Extensive process descriptions of the steps followed by governmental agencies to fulfill a service is provided. There is clear provision of linking to other related services and services in the same class of a life-event like categorization. There is clear provision of information for the service execution⁹⁰.

4.4.2 Australia

UI: Simple and friendly UI, full support for mobile devices with JavaScript based framework for front end.

Architecture: The portal is using a well-known (i.e. Drupal) stable open source tool to build the main CMS. Platform is PHP based. The myGov portal handling citizen accounts and delivering services uses another platform and technology (Java based upon Apache server). Although this is an acceptable technological choice, it is not recommended practice as it generally requires more effort to maintain and integrate information across portals.

Communication: Digital communication is supported with no apparent support of physical support. When starting a service, a new kind of interface appears obviously revealing other platforms connected to the central portal. There is an easy access to a personal e-letterbox through “myGov” choice; at least from the central site there is no any central option provided to the user. There is a page link to get help, however it is not very helpful as the user must navigate a lot. There is a personalized service for registered users of the Department of Human Services⁹¹. Although it was not possible to evaluate the overall functionalities of this part as this service is addressed to Australian citizens or inhabitants, it seems a very powerful service platform with very interesting characteristics. A comprehensive list with all governmental apps is available⁹², coupled with a search engine to look for apps by agency or keyword. A list of all official social media accounts maintained by governmental agencies is also available⁹³. The portal through “myGov” account offers an e-letterbox for Australian services like JobSearch, Australian Taxation Office, Centrelink, Child Support, Veterans’ Affairs, Housing Online Services, Medicare, My Health Record, National Disability Insurance Scheme.

Service evaluation: Per page, users have the possibility to report a problem or mistake. Moreover, users can share a page with social media or other means. Additionally, users can ask questions and chat via a Web chat application which is available 8am - 8pm Monday to Friday nationally.

Usability: Using an audio assistant service, users have the possibility to listen what is included in the whole page or highlight sentences/parts of the text and listen via an embedded to the portal audio assistant application. The audio assistant service provides audio of high quality. There is an apparent appropriate use of metadata accompanying a service, search facility, simple way of navigation for locating services and organized under specific classes resembling life-events.

Interinstitutional: Extensive process descriptions of the steps followed by governmental agencies to fulfill a service is provided. There is clear provision of linking to other related services and services in the same class of a life-event like categorization. However, the Australian portal does not reach the benchmark the UK platform has introduced.

90 Same as above

91 <https://www.centrelink.gov.au/>

92 <https://www.australia.gov.au/news-and-social-media/apps>

93 <https://www.australia.gov.au/news-and-social-media/social-media>

4.4.3 Finland

UI: Simple and friendly UI, full support for mobile devices with JavaScript based framework for front end.

Architecture: The portal is using a JavaScript based environment (i.e. webpack) to build the main CMS. The main site provides links to other sites that facilitate the execution of the service at central or local level. These sites are built in various technologies. For instance, the user in order to perform actions related to “driving license” has to navigate to other platforms that are based on other technologies like Liferay and Java framework⁹⁴. This fragmentation practice in portals is introducing in general difficulties in service and platform integrations.

Communication: Digital communication is supported with specifically denoted support of physical support. When starting a service, a new kind of interface appears obviously revealing other platforms connected to the central portal. There is access to a personal e-letterbox like “myGov” choice. The means of electronic identification are many e.g. he/she can have an eID type even through a bank. There is no link to central pages to let users follow public administrations on social media.

Service evaluation: Per page, users have the possibility to report a problem or mistake on each page. They can also provide feedback with a special form.

Usability: Good use of metadata accompanying a service, search facility, simple way of navigation for locating services and organized under specific classes resembling life-events. The users can ask for help through a form and receive help through phone call or e-mail. However, they have to navigate to a different platform.

Interinstitutional: Extensive process descriptions of the steps followed by governmental agencies to fulfill a service is provided. There is clear provision of linking to other related services and services in the same class of a life-event like categorization. There is no provision of information for the service execution.

4.4.4 Estonia

UI: Simple and friendly UI, full support for mobile devices with JavaScript based framework for front end.

Architecture: The portal is using a JavaScript (i.e. jQuery) based environment to build the main CMS.

Communication: Digital communication is supported with no obvious support of physical delivery channels. When starting a service, a new kind of interface appears obviously revealing other platforms connected to the central portal. There is access to a personal e-letterbox like “myGov” choice. There is no link to central pages in order to let users follow public administrations on social media. In Estonia, special focus is placed on the ‘*once only*’ principle in e-government and data management, meaning that administration is not allowed to ask citizens for the same information twice.

Service evaluation: Per page, users have the possibility to report a problem or mistake on each page. This is achieved through the simple question links “Found the necessary information / Did not find the necessary information”, which in the latter case asks for more feedback on what it is wrong. Moreover, users can share a page with Facebook only. Portal is using both Google analytics and Matomo for web analytics information.

94 e.g. <https://asiointi.trafi.fi/en/web/asiointi/henkiloasiakkaat/tieliikenne/kuljettajatielopalvelut>

Usability: Good use of metadata accompanying a service, search facility, simple way of navigation for locating services and organized under specific classes resembling life-events. However, search is helpful with autocomplete functions and decreases the user effort to find what he/she needs. For instance, to trigger the execution of the service “start a new business” the user has not to navigate a lot. Additionally, there are consulting services offered. There is only an e-mail offered to help users contact the service providers.

Interinstitutional: Extensive process descriptions of the steps followed by governmental agencies to fulfill a service is provided. There is clear provision of linking to other related services and services in the same class of a life-event like categorization. There is clear provision of information for the service execution.

4.4.5 Canada

UI: Simple and friendly UI, full support for mobile devices with JavaScript based framework for front end.

Architecture: The portal is using a Java based environment to build the main CMS with Adobe Experience manager as a tool for the maintenance and administration of the portal.

Communication: Digital communication is supported with no apparent support of physical support. When starting a service, a new kind of interface appears obviously revealing other platforms connected to the central portal. There is no highlighted access to a personal e-letterbox like “myGov” choice; however, from the central site’s web page there is a central option provided to the user under “Sign in to an online account”. But still there is not one single account for citizens to access all governmental electronic services. Although the large number of accounts indicates the availability of several personalised and mature services from different agencies, the lack of a single-sign-on is problematic. Additionally, there is a link to central pages to let users follow public administrations on social media.

Service evaluation: Per page, users have the possibility to report a problem or mistake on each page. Moreover, users can share a page with social media or other means.

Usability: There are use helpful and explanatory videos, coupled with some banners with 3-4 videos per type of service. All these are published on YouTube, while there is a follow button for the YouTube official account. Good use of metadata accompanying a service, search facility, simple way of navigation for locating services and organized under specific classes resembling life-events.

Interinstitutional: Extensive process descriptions of the steps followed by governmental agencies to fulfill a service is provided. There is clear provision of linking to other related services and services in the same class of a life-event like categorization. There is clear provision of information for the service execution.

4.4.6 USA

UI: Simple and friendly UI, full support for mobile devices with JavaScript based framework for front end.

Architecture: The portal is using a well-known (I.e. Drupal) stable open source tool to build the main CMS. Platform is PHP based. There is no central “myGov” portal handling citizen accounts and delivering services. Accounts for users are organised and delivered under U.S states portals. Although this is an acceptable technological choice, it is not the recommended best practice as it generally requires more effort to maintain and integrate information across portals.

Communication: Digital communication is supported with no apparent support of physical support. When starting a service through a U.S. state portal, a new kind of interface appears obviously revealing other platforms connected to the central portal. There is no access to a personal e-letterbox through “myGov” choice; at least from the central site there is no any central option provided to the user. Communication is supported by a variety of channels like e-mail, chat, phone. There is ability to subscribe to newsletters.

Evaluation: Per page, users have the possibility to evaluate each page. Moreover, users can share a page with social media or other means. Additionally, users can ask questions and chat via a Web chat application.

Usability: Users can easily find the service they want under a search facility that organize services under topics. Search results paper also in textual or visual formats supported by a Bing supported search engine. Good use of metadata accompanying a service, search facility, simple way of navigation for locating services and organized under specific classes resembling life-events.

Interinstitutional: Extensive process descriptions of the steps followed by governmental agencies to fulfill a service is provided. There is clear provision of linking to other related services and services in the same class of a life-event like categorization. There is clear provision of information for the service execution.

4.4.7 New Zealand

UI: Simple and friendly UI, full support for mobile devices with the Bootstrap JavaScript based framework for front end.

Architecture: The portal is not using a well-known (e.g. Drupal) stable open source tool to build the main CMS.

Communication: There is no easy access to a personal e-letterbox through “myGov” choice; at least from the central site there is no any central option provided to the user. No social media and variety of communication channels are offered.

Service evaluation: Per page, users have the possibility to report a problem or mistake on each page. Users can not share a page with social media or other means. They can do it in pages that offer the delivery of the final service⁹⁵.

Usability: There is simple, yet effective search facility. Good use of metadata accompanying a service, search facility, simple way of navigation for locating services and organized under specific classes resembling life-events. Content is clear and comprehensive.

Interinstitutional: Extensive process descriptions of the steps followed by governmental agencies to fulfill a service is provided. There is no clear provision of linking to other related services and services in the same class of a life-event like categorization. Moreover, there is clear provision of information for the service execution.

4.4.8 UAE

UI: Simple and friendly UI, full support for mobile devices with Bootstrap JavaScript based framework for front end.

Architecture: The portal is using the well-known AngularJS framework to build the main CMS. It utilizes all modern frameworks and libraries for implementing content and web analytics. Log in portal is supported by the same architectural choices and technologies.

⁹⁵ e.g. NZ transport agency at <https://www.nzta.govt.nz/driver-licences/renewing-replacing-and-updating/renewing-your-licence>

Communication: Using an audio assistant service, users have the possibility to listen what is included in the whole page or highlight sentences/parts of the text and listen via an embedded to the portal audio assistant application. The audio assistant service provides audio of high quality. Digital communication is supported with no apparent support of physical support. When starting a service, a new kind of interface appears obviously revealing other platforms connected to the central portal. There is an easy access to a personal e-letterbox through “myGov” choice. Log in supported though the so called SpartPass technology, using accessibility options and modern technologies like QR code. There is a page link to get help through various means and channels (i.e. chat with the UAE mGov, Contact govt entities, and Contact UAE government officials. Provide Feedback and suggestions through forms, or even use a Forum.

Service evaluation: Per page, users have the possibility to report a problem or mistake on each page. Moreover, users can follow a page with social media or other means. Additionally, users can ask questions and chat via a Web chat application. Polls are used to gather evaluation data from citizens⁹⁶ and statistics and open government data are provided through special portals^{97 98} that are accessible by the central web page.

Usability: Using an audio assistant service, users have the possibility to listen what is included in the whole page or highlight sentences/parts of the text and listen via an embedded to the portal audio assistant application. The audio assistant service provides audio of high quality. Good use of metadata accompanying a service, search facility, simple way of navigation for locating services and organized under specific classes resembling life-events. There is also ability to change text size and colors to every page.

Interinstitutional: Extensive process descriptions of the steps followed by governmental agencies to fulfill a service is provided. There is clear provision of linking to other related services and services in the same class of a life-event like categorization. There is some provision of information for the service execution under certain dashboards provided⁹⁹.

4.5 Recommendations

In this section, we summarize the good practices identified in the analyzed e-government portals and provide recommendations. An indicative best practice implementation link is also provided per recommendation.

User Interface:

- R1. The portal design should promote clear layout, with simple color schemes, use of same CSS (cascading stylesheets) across whole site¹⁰⁰.
- R2. The portal design should support responsive design and mobile support for all pages of the portal¹⁰¹.
- R3. The portal design should support for font sizing/flexibility through either the interface or the browser. Portal should support other languages¹⁰².
- R4. The portal should provide rich media and/or audio support in order to deliver its content following WCAG 2.0¹⁰³.

96 <https://www.government.ae/participate/polls>

97 The UAE portal for the Sustainable Development Goals, <http://uaesdgs.ae/en>

98 The official data portal of the UAE Government, <http://bayanat.ae/en>

99 e.g. <http://bayanat.ae/en/Categories/Social/Visualizations/Employment>

100 Example: UK - <https://www.gov.uk/>

101 Example: UAE - <https://www.government.ae/#/>

102 Example: UAE - <https://www.government.ae/#/>

103 Example: Australia - <https://www.australia.gov.au/accessibility>

Architecture:

- R5. The portal should ideally use well-known, supported and stable software used for server (e.g. Apache on Ubuntu)¹⁰⁴.
- R6. The portal should ideally use well-known, supported and stable software used for the platform (e.g. Drupal)¹⁰⁵.
- R7. The portal should ideally use open source software modern, supported and not outdated.
- R8. The portal for login or user accounts should be integrated with the basic portal supporting the same architectural and design choices¹⁰⁶.

Communication:

- R9. The portal should provide a unique identification mechanism for the user to login¹⁰⁷.
- R10. The portal should support service delivery through various means digital and not¹⁰⁸.
- R11. The portal should support social media integration by either sharing or following governmental accounts¹⁰⁹.
- R12. The portal should allow for both push and pull communication mechanisms. This is supported by registration forms, providing e-mail or even phone numbers of the user in order government to inform him/her upon needs. The portal should support alerts and notifications to the user. A common example is following a page or registering to a newsletter¹¹⁰.
- R13. The portal should provide support mechanisms to the end-users (e.g. help-desks, way to communicate e.g. forms, e-mails, chats etc.)¹¹¹
- R14. The portal should ideally facilitate provision of an e-letter box account for the user. This could be a personal account where the user can see all his/her requests, historical service requests, subscriptions to alerts etc¹¹².

Evaluation:

- R15. The portal should provide feedback mechanisms available to the users. These feedback mechanisms can be a form and should ideally provide motivation in order not to be anonymous¹¹³.
- R16. The portal should support mechanisms that take into account feedback from the user (citizen/business). For example, a site could inform users that 20% of the users have voted that X service has to be changed in Y aspect. This actually re-uses web analytics data¹¹⁴.
- R17. The portal should have facilities to analyze available data (if any) concerning the service portal evaluation from user (citizen or business) perspective. For instance, a site may inform users that the mean delivery time of the service is X, thus making the user knowledgeable of what to expect¹¹⁵.

104 Example: USA - <https://www.usa.gov/>

105 Example: USA - <https://www.usa.gov/>

106 Example: Australia - <https://www.australia.gov.au/>

107 Example: UAE - <https://www.government.ae/#/>

108 Example: Finland - <https://www.suomi.fi/frontpage>

109 Example: Canada - <https://www.canada.ca/en/social.html>

110 Example: USA - <https://www.usa.gov/>

111 Example: USA - <https://www.usa.gov/contact>

112 Example: UAE - <https://www.government.ae/#/>

113 Finland - <https://www.suomi.fi/feedback/footer>

114 Example: UAE - <https://government.ae/en/participate> UAE - <https://government.ae/en/participate/polls#>

115 Example: UK - <https://www.gov.uk/performance>, Estonia - https://www.eesti.ee/eng/topics/business/riigiportaali_abi/partnerile_1/eesti_ee_2016_aasta_statistika

Usability:

- R18. The portal should cater accessibility issues. For instance, using an audio assistant service, users have the possibility to listen what is included in the whole page or highlight sentences/parts of the text and listen via an embedded to the portal audio assistant application¹¹⁶.
- R19. The portal should provide high-level of user-friendliness. For instance, capability to change font sizes and colors of the web page are attributes that leverage user-friendliness. Easy navigation mechanisms like “breadcrumbs” techniques are also considered assets of web page design.¹¹⁷
- R20. The portal should support the easy finding of a service and its description. Organization of services under categories similar to the idea of life-events promotes user satisfaction and easy service discovery¹¹⁸.
- R21. The portal should support friendly, quickly, and simple browsing through service portal content. For instance, provision of service metadata and facilitation of search under various facets¹¹⁹.

Interinstitutional:

- R22. The portal should provide descriptions making service execution transparent, especially when the delivery of a service involves more than one department that should collaborate¹²⁰.
- R23. The portal should provide information about which connections and dependencies of a service to other services exist. A way to provide such information is through the service descriptions where links between services, or links between services and the life-events can be documented and explained¹²¹.
- R24. The portal should provide information about cost and duration of service delivery along with integration mechanisms to services that are relevant¹²².

4.6 References

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116 Example: UAE - <https://www.government.ae/#/>

117 Example: UAE - <https://www.government.ae/#/>

118 Example: UAE - <https://www.government.ae/en/information-and-services#/>

119 Example: Finland - <https://www.suomi.fi/search?q=driving%20license&f=0 &mode&s>

120 Example: UK - <https://www.gov.uk/set-up-business>

121 Example: UK - <https://www.gov.uk/learn-to-drive-a-car>

122 Example: Australia - <https://ablis.business.gov.au/search/activity> and UK - <https://www.gov.uk/learn-to-drive-a-car>

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5 Requirements for notifications and communication with users

Define requirements for application that presents notifications and communication with users

5.1 Introduction

In this section, we analyze service portals with the aim to identify and formulate a list of requirements and good practices concerning notifications and communication to the users.

5.2 Methodology and portal assessments

We evaluate the same group of portals analysed in the previous section in relevant dimensions. To achieve comparative assessment in a systematic manner, we have created an assessment model comprising of communication and notification characteristics and features service portal usually contain. The model is similar to the one presented in the previous section.

We evaluate each area with an integer number representing the number of criteria the service portal fulfills. For instance, in “Social media presence” area, if UK’s portal uses two social media, UK gets a score of 2. Then, this is multiplied by the weighting factor of this category i.e. for UI weight is 15%. For our case that is $2 * 15\% = 0.3$. All weighted criteria sum up to the total of grading achieved by a governmental site. In UK’s case the sum is 2.4.

The model contains the following six distinct dimensions:

1. **Single point of user verification:** It concerns usage of technologies that allow for single digital sign-on and single way of e-government systems communicating with users. There can be multiple communication channels to send notifications to the user. An example solution is the use of eID¹²³ to identify a citizen related to a service. The highest grade of 2 here is for cases where a single digital solution with 2-step user verification is used. The 2-step verification model, especially when used with a variety of channels that the user can choose on-line (e.g. SMS, fingerprint, e-mail etc.) is considered technically more secure. This way a username and password are often not enough to verify a user. Thus, grades are as follows: 0-No eID method used, 1-eID is used but with only 1 step verification (e.g. initial registration with username and password), 2-Verification of eID with two-steps and several methods and channels co-exist.
2. **Channels:** This criterion concerns the available channels (e.g. physical letters by post-office, digital faxes, e-mails, digital e-letterboxes, etc.) through which the portal can communicate with the user or is offered to the user. Grading varies from 0-4 reflecting: 0-No communication channel is used (i.e. even no physical reply by post seems to be achievable through the service portal), 1-One digi-

¹²³ e-Identification, accessed 30/6/2018 from <https://ec.europa.eu/digital-single-market/en/e-identification>

tal communication channel used, 2-Two digital communication channels used, 3-More than two digital communication channels used, 4-Digital and physical communication channels used.

3. **Social media presence:** This criterion focuses on the use of the service portal of social media platforms and their interconnections. Grades 0-3 as follows: 0-No social media channel is used on the portal (i.e. no links, no sharing etc.), 1-One social medium is used (e.g. only Facebook), 2-Two social media channels are used, 3-More than 2 social media channels is used.
4. **Push vs Pull:** This factor is concerned with the degree of bi-directional communication as well as the pro-active versus re-active behavior of the portal toward users. Grades 0-3 as follows: 0-no messages is exchanged between portal and the user, 1-Only user can send messages (e.g. report a problem) without receiving feedback, 2-User sends a message and receives feedback for it (e.g. through an SMS, e-mail etc.), 3- portal can send push notifications to the users in a two-way communication channel.
5. **Support:** This criterion is concerned with the provision of support towards the user as far as communication with the portal is concerned. Grading spans from 0-3 as follows: 0-no help is provided to the use by any means, 1-3: Taking a point for deployment for any compilation of the following support mechanisms: 1. provision of a Helpdesk with e-mail and/or telephone and/or physical point of contact, 2. audiovisual and textual descriptions of usage of systems (e.g. Help Guides), 3. innovative ways to communicate (e.g. chat rooms, chat bots, etc.).
6. **Personal e-letterboxes:** It concerns the provision of a single personal e-letterbox where all documents and data collections requested by the users reside and are available for future retrieval. Implementation of this feature is evaluated across all selected portals. Grading here spans from 0-2 as follows: 0-no personal e-letterboxes exist, 1-personal e-letterboxes exist in the sense that replies to messages with attached documents are stored in a e-document library, 2-personal letterboxes exist and are described to facilitate advanced functionalities such as signing documents, re-using previously issued documents for new applications and services etc.

We present the results of the analysis in Table 9 below.

The total result of this table for each country has been used as input to the previous chapter.

Table 8: Analysis of good practices in notifications and communication with users

Portal Grading → Weights →	User ver. 0-2 20%	Channels 0-4 15%	Social 0-3 15%	Push/pull 0-3 15%	Support 0-3 15%	e-Letterboxes 0-2 20%	Total 100%
UAE	2	4	3	3	3	2	2,75
UK	1	3	3	3	3	2	2,4
Estonia	2	2	1	3	2	2	2
Finland	2	3	0	3	2	1	1,8
Canada	1	2	3	3	2	1	1,9

Portal Grading → Weights →	User ver. 0-2 20%	Channels 0-4 15%	Social 0-3 15%	Push/pull 0-3 15%	Support 0-3 15%	e-Letterboxes 0-2 20%	Total 100%
Australia	1	3	3	3	3	1	2,2
USA	1	3	3	3	3	1	2,2
New Zealand	0	1	0	1	2	0	0,6

To identify good practices in this area, we use the behavior of the portals in communications and notifications towards the users for the same two services across all portals. These services are: a) renewal of a driving license, b) establishing a new company. In all the eight governmental portals that we analyzed, these services were offered either under the same or a similar title.

5.3 Identified good practices and recommendations

We provide a list of examples and best practices of sites using advanced notification and communication features with the citizens/users. This list is in a form of a tabular recommendation guide that classifies and organizes recommendations under the aforementioned criteria. These recommendations can be interpreted also as requirements from a new system design. Notice that along each good practice (GP), we provide information about the portals that have implemented the relevant good practice.

Table 9: Good practices and recommendations for communication and notifications

Criteria	Recommendations	Good practice (GP)	Portals encountered (best implementations)
User verification (eID)	Simple digital sign-on of the user for all services	GP1. Single eID GP2. Mobile app support	UAE, Estonia. UK UAE, Estonia
Channels	Support all channels of communication (whether digital or not)	GP3. Land-based and 3 rd party support GP4. Variety of channels in digital support GP5. Provision of mobile applications	Finland UAE Australia
Social media	Have an updated social media presence to inform and take feedback from society	GP6. YOUTUBE videos GP7. Facebook page GP8. Twitter news	Canada
Push and/or pull communication	Apply pro-active eGovernment by informing users according to their needs (e.g. newsletters)	GP9. Subscriptions (e-mail) GP10. On-line registration forms GP11. Support phone call communication	USA UAE, Estonia Finland, USA
Support	Provide various means to support users fulfill their needs (besides simple information navigation through a portal)	GP12. Faceted search GP13. Search facilities (autocomplete, filter by topic etc.) GP14. Support through E-mail, Forms, Phone, Chat	UK Australia USA

Criteria	Recommendations	Good practice (GP)	Portals encountered (best implementations)
Personal e-letterboxes	Use a single user e-letterbox along with eID method to facilitate a digital “folder” of transactions, data and documents	GP15. Single account for all services GP16. Mobile version of an e-letterbox	UAE, Estonia, UK, Australia UAE, Australia

5.4 Reference

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6 Tools for service platforms analytics

Carry out better evaluation tools to monitor users' behavior on the portal, such as google analytics, heat maps and how they can be used on digital public service platforms

6.1 Introduction

The objective of this section is to identify and suggest relevant web analytic scenarios and tools that can help in analyzing the response of citizens and to further help improving the governmental processes and services offered by digital public service platforms. For this, we focus on commercial strategies and solutions (i.e. tools) used in the private sector usually in the area of e-commerce. There, the term "web analytics" is mostly used.

In this section our aim is to:

- a) Showcase usage scenarios, benefits and use case examples to exemplify the role of analytics for service platforms.
- b) Use an adapted methodology for linking e-government maturity stages to objectives, KPIs and finally tools for using analytics for e-government service portals. We apply this methodology to analyze national public service portals.
- c) Present results and conclusions from analysis of national service portals using web analytics tools.
- d) Draw recommendations for using a framework of analytics and relevant tools.

6.2 Usage scenarios, benefits and good practices of analytic tools

6.2.1 Usage scenarios

Analytics tools are nowadays heavily used by all industries to create value to businesses and organisations. The public sector is considered an area where relevant tools can also deliver significant value and support the ongoing digital transformation. Areas where analytics is - and could be - commonly employed in the public sector are indicatively listed on the table below.

Table 10: Usage scenarios of analytics to e-governance (source: Nandan, T., & Chand, M. G., 2007)

Area of use (use case)	Usage scenarios	Role of analytics
Public safety	Crime incident analysis	Understanding which type of crimes are committed and where they happen
	Court sentencing analysis	Ensuring that all cases are processed efficiently through the court system
Education	School district planning	Identifying and planning districts that ensure fair and efficient education

Area of use (use case)	Usage scenarios	Role of analytics
	Student tracking	Discovering which factors contribute to student success
	Administration	Meeting mandated program and testing standards
Revenue	Property taxation assessment	Ensuring that assessments are accurate and equitable
	Delinquency analysis	Identifying possible criminals towards loan reimbursements
	Fraud analysis	Profiling those with the greater tendency to commit fraud
Health and social sciences	Disease tracking & prevention	Tracking and report the occurrences of diseases, identifying populations at risk and in need of intervention
	Epidemiology	Identifying causes, distribution and control of diseases
	Utilization of medical aid facilities	Developing detailed profiles of those who most frequently need medical assistance services
Labor	Labor force analysis	Understanding the structure of the labor force
	Insurance claims	developing claimants' profiles
Environment	Eco-system analysis	Understanding which factors contribute to a healthy eco-system
	Water/Air quality testing	Ensuring water or air quality against pre-determined standards
Transportation	Accident reporting	Understanding factors contributing to accidents
	Road maintenance modeling	Predicting when roads will need repair
	Program evaluation and strategic planning	Statistics are also a crucial part of program evaluation and strategic planning.
Program evaluation	Client satisfaction analysis	Assessing extent of success in meeting public needs
	Program evaluation	Understanding factors that make a successful program
	Cost benefit analysis	Understanding which programs are the most cost effective
	Outcome analysis	Assessing client improvement
Strategic planning	Econometric forecasting and analysis	Understanding how economic patterns affect businesses
	Employee satisfaction	Discovering employee attitudes
	Resource planning	Ensuring that the necessary resources have correctly been identified
	Total quality management / Business process reengineering	Ensuring agency efficiency

6.2.2 Main benefits and good practices

Governments across the world, at local, state and federal level, acquire certain benefits from incorporation of business intelligence (BI) & Analytics tools in their operations. These tools can bring about a substantial transformation in government and enhance its relationships with citizens by improving performance and efficiency. Below we analyze the **main benefits** of incorporating analytic tools in e-government. These beneficial areas are found in relevant reports¹²⁴, and here they are further analyzed. In parallel, we identified and provide some good practices from countries that have applied successfully relevant analytic tools in their national service portals.

Enhanced service delivery: Typical service and process improvement efforts tend to be implemented in silos, due mainly to complex procedures and fragmented data sets. This legacy constraint can be addressed by analytics solutions in areas like: a) inform citizens about their interactions with governmental agencies, b) present service transactional data to all stakeholders, c) improve governmental processes for service delivery. Some relevant and successful case examples are:

- A government organization in Qatar recently leveraged BI & Analytics to introduce insights into its processes and enhance reporting and decision support¹²⁵. This agency has implemented a tool that provides appropriate, easy-to-use and real-time trade data to both external and internal users. The key issues the agency had to overcome during implementation were associated to data quality and the capability to integrate data from various sources.
- An Australian Digital Transformation Office uses analytics¹²⁶ to improve provision of government services. This agency explores call requests and uses exploratory findings to modify related government portals with the objective to drive quality in call answers and eventually support the end-users in more effective and efficient ways.

Improved public services: Through analytics public administration improves services in many areas.

We indicatively use the example of health care services. There are governments across the globe that are using analytics and business intelligence techniques to improve healthcare services delivery. Data driven decisions can lead to improved healthcare outcomes, efficient and proactive planning. Through healthcare analytics agencies assess risk profiles of patients and better plan healthcare needs. Electronic and on-line health records are used to enable doctors and individuals to access their medical history at any time and view previous diagnoses, test results, prescriptions and current treatments. Vertical and horizontal integration of processes and departments offering health and safety services can be leveraged. Statistics about live visitors and portal search along with tasks completed successfully can be integrated with customer relationship systems (e.g. call centers for emergencies) offering evidence for improving health services.

124 Driving transformation in Government through analytics, <http://www.malomatia.com/English/images/BI-White-Paper>

125 Driving transformation in Government through analytics, <http://www.malomatia.com/English/images/BI-White-Paper>

126 Australia: Google Analytics for government, <https://beta.dta.gov.au/our-projects/google-analytics-government>

Some indicative relevant and successful case examples of service improvement are:

- The health ministry in Singapore is promoting analytics adoption by providing easy to use analytics, BI and data warehousing tools to represent data as actionable information¹²⁷. Staff can now visualize real time data and take quick decisions for efficient healthcare delivery. In addition, hospitals analyze usage patterns to better match medical staff with predicted patient appearances.
- Kenya practices data driven decision making to identify 'at risk' zones for malaria. They then drive preventive actions by analyzing people movement through tracking their mobile devices¹²⁸.

Cost savings: Government departments consider technology as a cost reduction or resource optimization enabler. The usage scenario here is to manage expenditure in a more effective way, supported by business intelligence analyzed data. This way service portal data can provide insights for well-organized investments in enabling infrastructures. Government agencies can leverage monitoring tools and predictive analytics to develop appropriate cost savings without lowering the quality of service delivery. Public sector tends to have legacy processes which in absence of on-line real-time monitoring tools and routine reviews lead to prevalence of redundant sub-processes. Analytics allows the governmental agencies to review and comprehend the service requirements and re-design processes appropriately. Tools, like Google Analytics, that grasp "voice of citizens", portal visitors' behavior, conversion rates etc. can play a significant role. Some relevant and successful case examples under this area are:

- Denmark transformed its approach to forecast electricity usage. Data is gathered from various partners to predict and produce required capacity as needed by business and individuals. With data-driven analysis, expected consumption is predicted on an hourly basis, thus decreasing wastage.
- United States Postal Service uses analytics to optimise its transportation network¹²⁹ and, in that way, promote higher asset utilization, resulting in considerable cost savings.
- A governmental agency in Seoul explored data from more than 25 years on pipe leakage and discovered a correlation between weather conditions and leakage points¹³⁰. These insights led to deployment of a new system that control pressure based on past data and analytics. This system has successively reduced the leakage rate from about 79% in 1987 to about 2.5% in 2014, resulting in noteworthy cost savings.

Resource optimization: Governmental agencies face the unique challenge in that user expectations are radically increasing, while the resources available are reducing. While users search for holistic, transparent and faster services, this gap will be amplified. A need exists for resource optimization. Analyzing usage patterns on the data collected by government agencies can help unleash opportunities to optimize limited resources and improve utilization. Increasingly, agencies are using analytics to deal with crime by

127 Using data analytics to drive population health research at SingHealth Health Services Research Centre, https://www.duke-nus.edu.sg/hssr/sites/hssr/files/files/3.%20Marcus%20Ong_Using%20data%20analytics%20to%20drive%20population%20health%20research%20at%20SingHealth2.pdf

128 Kenya Malaria Operational Plan, <https://www.pmi.gov/docs/default-source/default-document-library/malaria-operational-plans/fy-2018/fy-2018-kenya-malaria-operational-plan.pdf?sfvrsn=5>

129 United States Postal Service Optimizes Business Operations with Real-Time Visibility and Analytics From Kinetica, <https://www.businesswire.com/news/home/20160712005529/en/United-States-Postal-Service-Optimizes-Business-Operations>

130 Korea shows how to use Big Data for development, <https://blogs.worldbank.org/voices/korea-shows-how-use-big-data-development>

using real time dashboards to identify high risk areas and optimize law enforcement deployment decisions. This approach can be replicated to other services such as utilities, especially electricity where any excess capacity cannot be stored. Moreover, public agencies can investigate traffic distribution by territory and time, and integrate all these with the citizen's database with web analytic tools. Thus, resource allocation can be optimized taking time and place parameters into account. A relevant and successful case example under this area is:

- In the UAE there exists a public-sector agency that oversees HR function within ministries and federal authorities. This agency uses HR analytics to design and introduce new HR policies with the objective of improving efficiency and performance of the public services staff¹³¹.

Fraud Reduction and security: With the use of BI and analytics governmental agencies can alleviate areas that are vulnerable to fraud, especially when information is fragmented and stored in silos. For governments shifting processes online, sharing data among agencies, identifying and eliminating systemic gaps can abolish errors and chances for fraud. Analytics and BI tools can be used for a universal view of interactions and services consumed and provide insights on usage patterns. Historical data can be used to feed predictive models, thus leveraging governmental strategies from re-active to pro-active. Tools that support "voice of citizens" can play a vital role here. Some relevant and successful case examples under this area are:

- Belgium has accomplished a reduction in tax fraud, resulting in savings of almost a billion euros each year¹³². Customs officers are provided with the facility to rank import-export transactions and estimate risk in real time and investigate beyond distinct shipments to reveal fraud. The historical transactional data are then combined in reports to help in risk mitigation for future custom shipments as well.
- Drancy suburb in Paris, radically improved city surveillance by using analytics to develop insights from real-time data over a fiber network that connected 300 CCTVs¹³³.

Concluding on the benefits, BI & Analytics can add significant value to e-government implementations. Analytics can be leveraged to increase adoption of services by citizens and businesses, improve government efficiency and effectiveness and scaffold higher quality service delivery. BI and analytics can be leveraged to detect which services need prioritization based on transaction volume, criticality of need of individuals and businesses, resource consumption and several factors related to the aforementioned areas that benefit from BI and analytics usage.

6.3 Proposed analytics tools for service platforms

For identifying and propose analytics tools usage for service platforms, we extend and use an existing model that identifies use of specific web analytics tools per eGovernment maturity stage. Our extension of the model aims at adding dimensions relevant to assess the use of analytics tools, especially, in service portals. The enhanced model is presented in tabular format (see Table 11) and links analytics and BI tools usage to

131 FAHR: Developing policies and guidance from HR data (pages 35-36), https://www.cipd.asia/Images/evolution-of-hr-analytics-a-middle-east-perspective_tcm23-22426.pdf

132 Q&A: How hybrid fraud detection cut losses by 98%, https://www.sas.com/en_us/customers/tax-fraud-belgium.html

133 Dubai - a new paradigm for smart cities (KPMG report), <https://assets.kpmg.com/content/dam/kpmg/pdf/2016/04/Dubai-a-new-paradigm-for-smart-cities-uae.pdf>

key performance indicators (KPIs) and objectives at each e-government maturity stage. Added or modified by us objectives, KPIs and tools are illustrated, in bold and italic fonts in the following table. Below we explain the model.

The different stages of the e-government maturity model have different objectives to achieve. Hence, these objectives need to be handled differently. The key performance indicators at every stage vary according to the objectives.

KPIs are metrics that can help grasp the necessary analytics information to help in achieving the related objectives e.g. the “bounce rate¹³⁴” KPI serves as a metric for identifying users’ ability to find what they want in service portals. In the last column, we connect KPIs and objectives to tools that can support and satisfy the related objectives.

For instance, Google Analyitcs¹³⁵ , Matomo¹³⁶ or Piwik¹³⁷ are tools that store, handle and present information about bounce rates of a web sites’ pages. We enriched the table of tools with ones that perform business intelligence analysis to visualize data. Modern tools from the area of big data handling (i.e. storing and analyzing) are also added.

KPIs in some of these cases have been further divided into smaller variables so that in-depth insights can be found. For example, bounce rate is an important KPI and should be used at all stages of Government portals. It is very significant to estimate how many users arrived in the portal accidentally and left the portal almost immediately. Moreover, it is essential to identify how much time users consumed on each page, what device they used, where they come from, etc. With high bounce rate it can be examined whether users are not satisfied with the content on the portal or they are not fully utilizing Government services online. Analyzing the reason why these situations happen can lead to actions towards improving service delivery.

Table 11: Proposed Web Analytics tools for each stage of e-Government¹³⁸

Stage	Objectives of each Stage	Key Performance Indicators	Web Analytic and BI Tool
Stage I: Information	Simply provide relevant information Update information regularly Uses are able to find the information <i>Provide various channels and sources to reach information</i> <i>Provide deep level (instead of shallow) information (see chapter 2 for comparison)</i>	Bounce rate Site experience of each stakeholder Content Distribution <i>Landing pages</i> <i>Traffic channels and sources</i>	Google Website Optimizer ¹³⁸ Google/ <i>Adobe</i> / <i>Matomo</i> Analytics ClickTracks ¹³⁹
Stage II: Interaction	Users can successfully download forms, guides, applications <i>or find the way to call a service</i> Users can send emails, give feedback, ask queries <i>Users can search within the portal based on meta-data facets</i> <i>User actions are fully tracked</i> <i>User receives feedback</i>	Measure downloads Voice of citizens Statistics about live visitors Portal Search option <i>Heatmaps, Visitor Recordings, Conversion Funnels, Form surveys</i>	Google Tag Manager ¹⁴⁰ Google/ <i>Adobe</i> / <i>Matomo</i> Analytics Kissinsights ¹⁴¹ Woopra ¹⁴² <i>HotJar</i> ¹⁴³

134 The percentage of visitors to a particular website who navigate away from the site after viewing only one page.

135 Google analytics, accessed 30/6/2018 from <http://www.malomatia.com/English/images/BI-White-Paper>

136 Matomo: Open Analytics Platform, accessed 30/6/2018 from <https://matomo.org/>

137 Piwik, accessed 30/6/2018 from <https://piwik.pro/>

138 Adapted and extended from Tripathi, R. (2017)

Stage	Objectives of each Stage	Key Performance Indicators	Web Analytic and BI Tool
Stage III: Transaction	<p>Users are able to register Users are able to complete the task of service request easily Users finish process of service delivery User behavior flow is captured and analyzed Users convert to "happy customers"</p>	<p>Track registered users Task completion rate Conversion rate Bounce Rate A/B testing User conversion rate</p>	<p>Google/ Adobe / Matomo Analytics Google analytics goal setting and follow-up (linking BI and web analytics)</p>
Stage IV: Integration	<p>To transfer the existing process in a bid to provide more efficient, integrated, unified and personalized services. Vertical and horizontal integration Setting goals of e-government against user satisfaction Forecast usage Handle e-government HR change (optimize resources, handle costs) Re-engineer processes</p>	<p>Traffic Distribution by Country/Territory and time Integrating the user's database with web analytic tool Goal setting Goal fulfillment Linking various heterogeneous data sources (e.g. analytics, user satisfaction surveys, performance data) Forecast</p>	<p>Big data tools (e.g. Hadoop, Hive)¹⁴⁴ Google/ Adobe / Matomo Analytics Google Data Studio¹⁴⁵ MS Power BI¹⁴⁶ SAS SPSS Python and JavaScript libraries for deep learning</p>

The web analytic tools proposed here are deliberately selected to be mostly open source or free. These tools are widely being used and have no general compatibility issues. Google Analytics is one of the most widely spread web analytic tool and very simple to install. Moreover, training users in Google Analytics is comparatively easy. Piwik (now Matomo) is an open-source tool that deserves also attention.

6.4 Tools used by the service portals

For analyzing service portals on analytics tool usage, we detect the analytics and BI tools implemented per portal by using the Wappalyzer¹⁴⁸ tool, which automatically tracks the technologies used in specific websites. In the following table, we present the tools used by these national service portals.

139 Google Website Optimizer, accessed 30/6/2018 <https://marketingplatform.google.com/about/optimize/>

140 ClickTracks tool, accessed 30/6/2018 from <http://www.clicktracks.com/>

141 Google Tag Manager, accessed 17/8/2018 from <https://marketingplatform.google.com/about/tag-manager/>

142 KissInsights, accessed 17/8/2018 from <http://www.kissinsights.com/>

143 Woopra, <https://www.woopra.com/>

144 HotJar, <https://www.hotjar.com>

145 Apache Big Data Tools, accessed 17/8/2018 from <https://projects.apache.org/projects.html?category#big-data>

146 Google data studio, accessed 17/8/2018 from <https://datastudio.google.com>

147 MS Power BI, accessed 17/8/2018 from <https://powerbi.microsoft.com/en-us/>

148 Wappalyzer, <https://www.wappalyzer.com/>

Table 12: Analytics tools used in national service portals

Portal per Country (see Table 6)	Main Tools used
UAE	Google analytics / Chart.js / Hadoop ¹⁴⁹ , SAS
UK	Google analytics / D3.js / Hadoop
Estonia	Google analytics
Finland	Matomo / Snoobi ¹⁵⁰
Canada	Google analytics / Adobe Sitecatalyst
Australia	Google analytics / New Relic ¹⁵¹ / VWO ¹⁵²
USA	Google analytics / Crazy Egg ¹⁵³
New Zealand	Google analytics / HotJar

From the above analysis, we conclude the following:

- Each **national strategy on using analytics tools for service portals is unique**.
- Most national public service portals use **Google analytics** tool.
- In practice the analysed portals **do not use tools** that we expected them to use:
 - **Open-source tools are not commonly used**. Only one portal is using an open source analytics tool (Finland uses Matomo).
 - Few portals try to introduce advanced analytic tools to **grasp user behavior** (e.g. USA uses “heat-map” tools like CarzyEgg).
 - Few portals are incorporating **visualization tool libraries** (mainly JavaScript based) (e.g. UK uses D3.js)
 - Very few portals seem to use **technologies for big data** handling and integrating those data with analytic data (e.g. UK uses Hadoop).
 - We have not found tools which are supposed to be **typical tools for supporting data analysis and BI**, e.g. DataStudio or MS Power BI.

6.5 Recommendations

Closing this section, we present recommendations concerning usage of analytic tools based on the above roadmap and the results/conclusions from the use of analytic tools by national service portals.

149 Dubai Open and Shared Data Framework, <http://dubaidata.ae/pdf/Dubai-Open-Shared-Data-Framework-20170427.pdf>

150 Snoobi, <https://snoobi.eu/en/>

151 New Relic Insights, <https://newrelic.com/>

152 VWO: A/B Testing and Conversion Optimization Platform, <https://vwo.com/>

153 Crazy Egg: Visualize visitor behavior, <https://www.crazyegg.com/>

Policy and organisational initiatives

- REC. 1 Promote and raise awareness towards **data-centric culture, data-driven administration, and evidence-based policy making.**
- REC. 2 **Draft a national data strategy.** A strategy for using analytic tools with specific objectives and KPIs should be documented. The methodology and model we have presented in this chapter can assist in this effort.
- REC. 3 **Give motivation for organizations to publish data** in machine-readable formats.
- REC. 4 **Engage government staff and citizens to analytics mentality.** This can be achieved by platforms that provide analytics' data as open and public data-sets (e.g. through data platforms like CKAN¹⁵⁴). Moreover, business intelligence tools that facilitate building of data stories with examples and guides is always a good idea to start with.
- REC. 5 **Invest on building teams and knowledge around data science and analytic tools.** Teams should be established, provided with resources and education on data science and analytic tools usage.
- REC. 6 **Organize data-centric efforts using a business-driven approach.** Usage scenarios and benefits presented in the first section of this chapter can help in this direction.
- REC. 7 **Fine tune services based on analytics, business intelligence analysis and forecasting.** Re-engineer public services according to analytic and other big data collected. Tools used here usually are off-line tools like Hadoop, SPSS etc.
- REC. 8 Prioritize service data usage analysis by **setting goals for user satisfaction.**
- REC. 9 **Draw a specific plan of objectives, KPIs and tools to be used.** The tabular model we presented can help in this direction.

For technologies and tools

- REC. 10 **Attempt to create and store data on the first place** e.g. through automated processes with monitoring mechanisms.
- REC. 11 **Provide analytics data and e-government data as self-service BI.** This means that tools should be made open, freely and easily accessible and configurable by end-users, whether public servants or citizens themselves. This allows government to become gradually transparent and users can contribute to building data stories and applications.
- REC. 12 Prefer **open source tools** if they exist for the task (e.g. Matomo).
- REC. 13 **Implement advanced analytic capabilities for services** e.g. user behavior deep tracking by using tools like HotJar, rather than simple analytics tracking.
- REC. 14 **Reassure plans for data quality and data interoperability** e.g. common data standards and formats.
- REC. 15 **Determine standards and techniques for analytics data privacy usage** e.g. clearly define how user navigation data are used, document data privacy, ask for permission to utilize web analytics data through cookies etc.

¹⁵⁴ CKAN open source open data platform, <https://ckan.org/>

6.6 Reference

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7 | Data sharing & reuse best practices

Map success cases of European Union data governance, with emphasis on data sharing and reuse aspects used to provide services, presenting use cases in contexts similar to Brazil

7.1 Introduction

In this part of the report, we try to identify success cases of data governance from the European Union, with emphasis on data sharing and reuse aspects used to provide services. These success cases could be used to influence or inspire similar use cases in the Brazilian context.

We first identify special types of data, where appropriate management and reuse is of critical importance. We present success cases of data governance for each type of data. Last, we present recommendations for data sharing and reuse.

7.2 Key data types for reuse: open data, metadata, master data

During eGovernment development, cross-boundary information sharing, and integration is important as critical information for running government operations are usually scattered around government agencies maintaining respective information systems. The demand for cross-boundary information sharing and integration exists not only across different levels of government agencies (the vertical dimension), but also among government agencies with different functionalities (the horizontal dimension) (Yang et al., 2012).

Data sharing challenges can be grouped into technological, organizational, political, and legal categories (Gil-Garcia and Pardo, 2005). The European Interoperability Framework (EIF) provides a model of four layers i.e. technical, semantic, organisational, legal to group together interoperability challenges and issues¹⁵⁵. There are different problems for data sharing in each of these levels. Different technologies, data models (Peristeras, 2013), organisational processes and legal constraints can hamper data sharing.

According to the Corporate Information Management Framework (CIMF) (Deasy et al., 2015) information should be shared in ways that make it easy to (re)use, deliver and exchange and it should be made available through multiple channels. The CIMF identifies the objectives and enablers that appear in Figure 21. Figure 21: Objectives and Enablers for data sharing according to the CIMF for data sharing in the public sector.

¹⁵⁵ https://ec.europa.eu/isa2/sites/isa/files/eif_brochure_final.pdf

Objectives:	Enablers
<ul style="list-style-type: none"> • Make information sharing the norm and open-by-default • Deliver to users what they need, when they need it • Foster transparency and collaboration across the whole organization • Provide multi-modal access (different devices, OSs, advanced GUIs and browsers) • Foster and enable innovation • Foster co-creation • Facilitate the creation of public value • Increase transparency • Support open government 	<ul style="list-style-type: none"> • Data and information interoperability and standards • Information that is published, searchable, findable and accessible across the whole organization via base registries • Open and linked data platforms • Incentives for information sharing and reuse • Government commitment to and support for openness following the PSI and open data initiatives • Multimodal access to information.

Figure 21: Objectives and Enablers for data sharing according to the CIMF

For this survey, we concentrate on three important types of data for modern public administrations. A short introduction on each of these types of data is presented below:

- Open government data: Open Government Data (OGD) is a philosophy- and increasingly a set of policies - that promotes transparency, accountability and value creation by making government data available to all¹⁵⁶.
- Metadata: Metadata is structured information that describes, explains, locates, or otherwise makes it easier to retrieve, use, or manage an information resource. Metadata is often called data about data or information about information¹⁵⁷. The focus here is on structural metadata and more specifically on data models, classifications, taxonomies, vocabularies, ontologies and reference data (e.g. codelists).
- Master data (aka Base Registries): The term “Base Registries” is used in Europe to refer to important authoritative public sources of information and data that is highly reused by other systems, services and organisations within public administration and by third parties (e.g. population and business registries, cadastral, etc). Base Registries are official, legally defined and recognised data storages for public sector master data. In the private sector the term Master data is used more frequently. Master data management (MDM) is a technology-enabled discipline in which business and IT work together to ensure the uniformity, accuracy, stewardship, semantic consistency and accountability of the enterprise’s official shared master data assets¹⁵⁸.

We present three good practices from where we try to extract useful findings and recommendations. A summary of the three cases and their value-creation is presented below.

156 Definition from OECD, <http://www.oecd.org/gov/digital-government/open-government-data.htm>

157 Definition from National Information Standards Organization (NISO), 2004, USA. Understanding Metadata: https://groups.niso.org/apps/group_public/download.php/17443/understanding-metadata

158 Definition from Gartner, <https://www.gartner.com/it-glossary/master-data-management-mdm/>

7.2.1 Open Data reuse and the case of the European Data Portal

In this part, we present a good practice for federated open data management and reuse across Europe. This is achieved using a common semantic standard and the development of a central registry (aka “yellow page”) infrastructure.

7.2.1.1 Open data in Europe

Governments possess a large amount of data which is of critical economic (e.g. (Ahmadi Zeleti et al., n.d.))scholarly efforts providing elaborations, rigorous analysis and comparison of open data models are very limited. This could be partly attributed to the fact that most discussions on Open Data Business Models (ODBMs (Zuiderwijk et al., 2016))complex interactions amongst a variety of stakeholders, a lack of criteria determining a satisfactory solution, including what constitutes ‘value’, and uncertain outcomes. Wicked problems cannot be solved by only considering part of the problem. Yet, open data efforts all too often focus mainly on open data publication and neglect the use of the data; while it is the use of data (not just publication and social (e.g. (Ruijter and Martinius, 2017)) value to the society. Along those lines, countries all over the world are developing policies to release this data as Open (Government) Data (Attard et al., 2016). In 2003, the European Union (EU) adopted legislation to foster the reuse of Public Data in Member States via the Public Sector Information (PSI) Directive 2003/98/EC (Katleen, 2011), which was revised in 2013 (Directive 2013/37/EU) (Janssen and Hugelier, 2013). The main amendments have been a) the adoption of the “open by default” principle, b) the breakaway from cost-based charging for PSI towards a marginal cost-oriented fee and increased transparency regarding calculation of the fees, c) the inclusion of certain cultural institutions as public sector bodies (previously outside the scope), and d) support for machine-readable and open formats.

In response to the requirements of the revised PSI directive, European public administrations have set up cross-domain and cross-organisational open data portals. These portals have significantly contributed to the establishment of the necessary foundation for a European open data ecosystem, creating value and paving the way towards data-driven governments, while some of them already support and publish linked data (Ding et al., 2012). Research efforts also exist to “lift” open government portals to the web with the use of web data standards (Waal et al., 2014).

7.2.1.2 The fragmentation problem and a standard-based solution

Limitations in real implementation of data portals appeared soon (Zuiderwijk and Janssen, 2014). In addition to the inherent political, cultural and linguistic diversity in Europe, the development of open data portals has not always been coordinated within and much more across countries. The use of different platforms and the lack of common semantics, metadata (Neumaier et al., 2016) and data models have resulted in a fragmented landscape of open data portals as disconnected information silos, making it hard to exchange metadata between them and interoperate. What is more important from the user perspective, citizens and businesses must query over 150 separate open data portals in Europe if they want to find and combine data and information referring to the whole EU. This situation leads to duplication of information and inconsistencies, it hampers cross-portal search, and limits the discoverability of datasets.

Overcoming the challenges described above, while respecting the subsidiarity principle, was only possible by creating a central reference point where information about where the data is stored could be kept. The idea has been to develop a registry infrastructure

and not a central repository, as a central, monolithic and pharaonic database would not be possible to be maintained by one central authority. The decision was to use a common descriptions standard for open data metadata, or to create a common metadata language for open data. Such a common metadata language, the DCAT Application Profile (DCAT-AP), was developed under the Interoperability for European Public Administrations (ISA²) Programme of the European Commission. By now, DCAT-AP is implemented by the European Data Portal (Wendy Carrara, Makx Dekkers, Benjamin Dittwald, Simon Dutkowski, Yury Glikman, Fabian Kirstein, Nikolaos Loutas, Vassilios Peristeras, 2017), by over 15 national data portals and by several portals at regional and local level (Klímek et al., 2018).

An Application Profile is a specification that re-uses terms from one or more basic standards, adding more specificity by identifying mandatory, recommended and optional elements, as well as recommendations for controlled vocabularies to be used. DCAT-AP is mainly based on the Data Catalog Vocabulary (DCAT), which was developed initially at the Digital Enterprise Research Institute in Ireland (Maali et al., 2010) (Cyganiak et al., 2010)UK and else- where have made large amounts of raw data available to the public on theWeb. There is enormous potential in applying Linked Data principles to these datasets. This potential currently remains largely untapped because governments lack the resources required to convert from raw data to high-quality Linked Data on a large scale. We present a self- service approach to this problem: By connecting a powerful Gridworks-based data workbench application directly to data catalogs, via a standard Data Catalog Vocabulary, data professionals outside of government can contribute to the Linked Data conversion process, thus obtaining data for their own needs and benefiting the larger Linked Government Data effort.,"author":{"dropping-particle":"","family":"Cyganiak","given":"Richard","non-dropping-particle":"","parse-names":false,"suffix":""},"dropping-particle":"","family":"Maali","given":"Fadi","non-dropping-particle":"","parse-names":false,"suffix":"","dropping-particle":"","family":"Peristeras","given":"Vassilios","non-dropping-particle":"","parse-names":false,"suffix":""},"container-title":"Proceedings of the 6th International Conference on Semantic Systems - I-SEMANTICS '10","id":"ITEM-1","issued":{"date-parts":["2010"]},"page":"1","title":"Self-service linked government data with dcat and gridworks","type":"paper-conference"},"uris":["http://www.mendeley.com/documents/?uuid=3de21c26-86fb-4625-818d-79e264e9ceff"]},"mendeley":{"formattedCitation":"(Cyganiak et al., 2010 and became later a W3C recommendation under the responsibility of the Government Linked Data Working Group¹⁵⁹. DCAT is an RDF vocabulary designed to facilitate interoperability between data catalogues published on the Web.

To meet local needs of implementers, extensions of DCAT-AP have been created. The need for such extensions is also mentioned in (Neumaier et al., 2017) where the authors use several web vocabularies to make available metadata from open data portals as linked data. Such extensions have already developed for the fields of geospatial (Pellegrino, 2017) and statistical (Dekkers et al., 2016) data: the GEO/DCAT-AP spec was developed under the coordination of the European Commission, Joint Research Center team responsible for the implementation of the INSPIRE Directive, and the STAT/DCAT-AP spec under the coordination of the European Statistics Office (EUROSTAT). Any DCAT-AP extension needs to follow certain guideline¹⁶⁰.

For this report, we focus on the European Data Portal (EDP)¹⁶¹ as a good practice of sharing and reuse open data from over 30 countries and 70 sources. Already in 2015,

159 https://www.w3.org/2011/gld/wiki/Main_Page

160 <https://joinup.ec.europa.eu/release/dcat-ap-how-extend-dcat-ap>

161 <https://www.europeandataportal.eu/>

there were over 150 open data portals in Europe, making it difficult for users at the European level to query, find and combine data from different sources. The EDP uses the DCAT-AP as a common language to create a European federation of data portals. EDP supports the following requirements (Wendy Carrara, Makx Dekkers, Benjamin Dittwald, Simon Dutkowski, Yury Glikman, Fabian Kirstein, Nikolaos Loutas, Vassilios Peristeras, 2017):

- A federation of data portals answers adequately the needs for better interoperability in cross-portal searches.
- Datasets are stored 'locally' in the data portal which is directly in contact with the data provider. The other portals and metadata brokers only use the catalogue of metadata to have the references, descriptions and locations of the datasets.
- A data consumer can search in his or her own language in one centralised portal which is harvesting individual portals with different languages.
- A single point of access is proposed for identifying and discovering data thanks to a common metadata vocabulary, to common search criteria, etc.
- Different analysis is possible due to portals federation. For instance, clustering, identifying relationships between datasets and developing cross-country and cross-domain data analysis scenarios are supported.
- Subscription services are available for data consumers who are interested to be notified of new data being published in certain domains or countries.
- Catalogue entries are harmonised, simplifying the compliance process of new metadata, enabling automated validation of metadata to take place.

The European Data Portal makes data available and re-usable across Europe. This is done by harvesting metadata from the Member States' data portals and making them available using common standards and searchable through a unique query page at the European Data Portal. The Portal GUI supports all 24 official EU languages for main editorial and metadata content. In 2017, the EDP was harvesting 76 sources, including 35 INSPIRE based geospatial portals, 28 CKAN portals, 4 file dumps in different formats, and 3 portals with more or less proprietary APIs. All sources together provide access to around 640,000 datasets. The contractors of the EDP but also independent developers from different countries have developed a considerable amount of open source tools to support DCAT-AP based exporting, harvesting, validation and editing.

More details on the implementation of DCAT-AP in the EDP can be found on report published in 2017 on the Joinup.eu platform (Wendy Carrara, Makx Dekkers, Benjamin Dittwald, Simon Dutkowski, Yury Glikman, Fabian Kirstein, Nikolaos Loutas, Vassilios Peristeras, 2017).

7.2.1.3 Existing challenges with open data sharing and reuse

Concluding, we present below some major challenges for the promotion of open data reuse as identified in (Peristeras, 2018):

- Governance. Open data should become part of the corporate information and data management plan. Although data is a valuable resource and as such it needs to be appropriately managed, we still lack policies for managing information inside public organisations. Much more managing open data as part of an overall corporate information management portfolio.

- Funding and costs. The initial enthusiasm underestimated the cost of publishing open data. There are direct costs related to the publication process and other important costs related to changing existing business models that are based on revenues for public agencies. Many time, upfront investments and long-term commitments of resources were not realistically estimated.
- Licensing and privacy. Licensing open data proven to be complicated, while ambiguity in this area prevents reuse. Moreover, privacy issues seem to deteriorate with the advancement of de-anonymisation techniques.
- Usability. In a rather naïve way, it was thought that open data could be used directly by everyone, by all citizens and businesses. However, special skills are required for using and getting value out of open data. This skillset is often quite advanced as the published data most of the times suffer from low quality, inconsistencies and need demanding curation, cleansing, integration, etc.
- Ecosystems. Open data alone is not enough. Applications, communities, power users, standards, platforms play not just a supportive role but are prerequisites for value creation.
- Just opening data in any form and format is not enough. Specific policies for promoting publication quality, ensuring interoperability and compliance to standards are needed to avoid a babel tower of open data. Advanced skills are also needed inside public organisations to support the whole open data life-cycle from generation to exploitation.
- Global applicability and national specificities. The open data movement was born in an Anglo-Saxon context. Its application to other countries and continents revealed specificities and special characteristics based on cultural, institutional, organisational factors that need to be carefully considered. It is not always easy to just copy practices from one country to the other.
- Evaluation and assessment. It is very difficult to evaluate in an objective and quantitative way, with hard evidence the value of open data, impact in transparency, efficiencies, innovation, jobs creation, etc.

7.2.2 Metadata management and reuse: the case of the EU Publications Office

In this part, we present a good practice for metadata management and reuse from the European institutions and Member States administrations.

The Publications Office of the European Union (Publications Office) is an EU interinstitutional office with the task to publish the publications and disseminate the information of the institutions of the European Union. Moreover, the Publications Office offers a number of online services giving free access to information on EU law (EUR-Lex)¹⁶², EU publications (EU Bookshop)¹⁶³, public procurement Tenders Electronic Daily (TED)¹⁶⁴, EU research and development portal Community Research and Development Information Service (CORDIS)¹⁶⁵ and the EU open data portal (EU ODP)¹⁶⁶.

162 EUR-Lex. <http://eur-lex.europa.eu/en/index.htm>

163 EU Bookshop. <https://bookshop.europa.eu/en/home/>

164 TED – Tenders Electronic Daily. <http://ted.europa.eu/TED/main/HomePage.do>

165 CORDIS. http://cordis.europa.eu/home_en.html

166 European Union Open Data Portal. <https://open-data.europa.eu/en/data/>

7.2.2.1 The need and the role of an EU Interinstitutional Metadata Registry

In the past, all the above services provided by the Publications Office were silos, each one with its own metadata, vocabularies and code lists. At a first round, a need was identified inside the Publications Office to consolidate metadata across domains (e.g. publications, tenders, scientific, legal information) and to create a horizontal content and metadata layer to support search and access in a coherent way.

At a second round, the need to adopt common metadata across the various EU institutions became apparent. This has happened as several European agencies are involved in the process of European lawmaking, and information is being processed and shared among many different information systems. There was therefore a need for common standards to allow automatic flow of data and information between systems and organisations, limiting the need for conversions and the costly intervention of humans for text and information formatting.

The EU Institutions asked the Publications Office to share their proposed solution to this problem which led to the establishment of the Metadata Registry (MDR)¹⁶⁷, maintained by the Publications Office, in which reference data (metadata elements, named authority lists, schemas, etc.) used by the different European Institutions involved in the legal decision-making process is registered and maintained in a controlled manner. For this reason, the Interinstitutional Metadata Management Committee (IMMC) was set up with the participation of all European bodies involved in the EU decision-making process, including the European Commission, the European Parliament and the European Council. The MDR governance is discussed and decided by the IMMC, and the Publications Office remains the organization that maintains and provides the relevant services to all partner organizations.

The most important content maintained in the Metadata Registry includes the followings:

- **Code lists:** To harmonize and standardize the codes and labels used by the Publications Office in the context of the data exchange between the institutions involved in the EU decision-making process, certain Named Authority Lists (NALs) have been defined. These are also known as (Common) Authority Tables (CAT), controlled vocabularies or codelists. These lists are multilingual. For example, the country codelist provides a common standard for identifying countries - in short and long form - in all the 24 official languages of the European Union.
- **The MMC Core Metadata element set relating to the European legislative process:** A minimum set of metadata elements (IMMC Core Metadata Model), which are used in the exchange of data on the decision-making process of the European institutions has been identified, set and maintained by the Publication Office. More information can be found on the relevant website¹⁶⁸.
- **EuroVoc thesaurus and alignments (SKOS/XML distributions):** EuroVoc is a multilingual, multidisciplinary thesaurus maintained by the Publications Office and covers the activities of the EU, and in particular the European Parliament. It includes terms in 23 EU languages as well as Serbian. More information is available on the relevant website¹⁶⁹.

¹⁶⁷ <https://publications.europa.eu/en/web/eu-vocabularies>

¹⁶⁸ IMMC Core Metadata, Documentation: <http://publications.europa.eu/mdr/core-metadata-schema/draft/documentation/pages/index.html>

¹⁶⁹ EuroVoc Thesaurus: <https://publications.europa.eu/en/web/eu-vocabularies/th-dataset/-/resource/dataset/eurovoc>

7.2.2.2 The Metadata Registry infrastructure and technology

The MDR consists of a back-office application for registry management and a front-office application to access the Metadata Registry content. Access to the back-office is limited to the Publications Office internal metadata group, while the site provides free and open access to all of its content to everyone. Furthermore, the Publications Office promotes the use of the MDR content (originally serving the EU Institutions) by the national, regional and local EU administrations as the use of common codelists promote interoperability amongst information systems and applications in Europe. The home page of the MDR website is shown below:

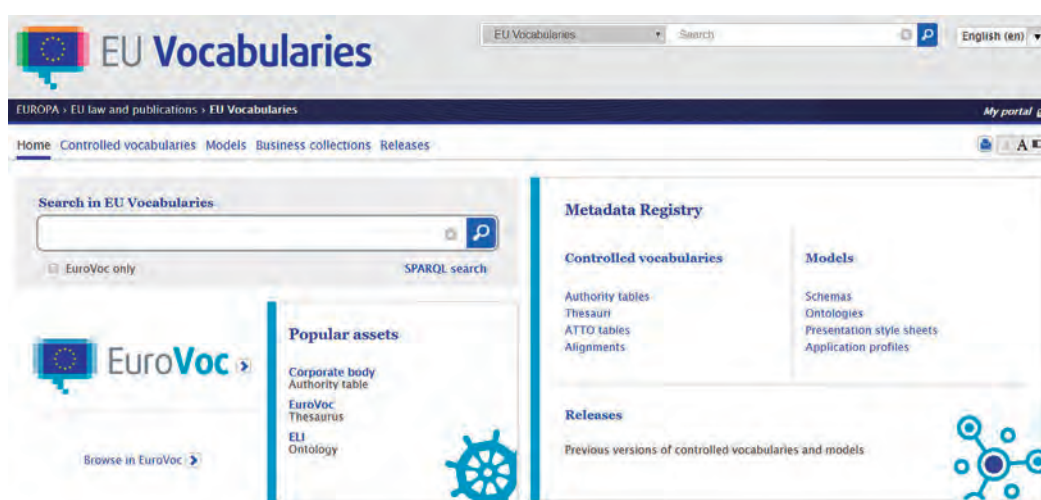


Figure 22: The front page of the EU Publications Office Metadata Registry (MDR)

The Publications Office of the European Commission (PO) uses the VocBench tool to manage the MDR and the EuroVoc treasure metadata. VocBench¹⁷⁰ is a web-based workflow tool for managing treasures, lists and glossaries based on SKOS and RDF standards. The tool was developed by the United Nations Food and Agriculture Organization (FAO) and is available as Open Source Software (OSS). VocBench supports collaborative multilingual terminology synthesis and allows roles to be assigned for the maintenance, validation and assurance of metadata quality. The ISA² Programme has supported the customisation of the VocBench tool to be used as the flagship platform for the management of all metadata and vocabularies maintained by the Publications Office.

7.2.3 Master data management and reuse good practices

In this part, we present some good practices and recommendations for master data management and reuse from European countries.

7.2.3.1 Base Registries and Master Data management in the public sector

The European Commission ISA² Programme has created a European Community of Practice¹⁷¹ where participants exchange experience and knowledge about “base registries”. The term “base registries” is used in Europe to refer to important authoritative

¹⁷⁰ Vocbench, <http://vocbench.uniroma2.it/>

¹⁷¹ <https://joinup.ec.europa.eu/collection/access-base-registries>

sources of information and data that is highly reused by other systems, services and organisations. In this sense, base registries are actually official, legally defined and recognised data storages for public sector master data. Due to this reason, appropriate management and reuse of base registries data is very important, and – amongst others - is considered as a prerequisite for achieving the Once-Only-Principle (OOP): instead of asking the citizen for information that they have already provided, public administrations should reuse the information they already have.

7.2.3.2 Good practices in Master Data management

Below in Figure 23, all the good practices identified by the ISA Programme are summarised grouped in the four layers of the EIF. Some of them are commented below, as more relevant in the Brazilian context. We follow the same numbering that appears in the figure.

Good practices at **legal** level

COMPLIANCE WITH LEGISLATION

Good practice No 1:

Equivalence of paper and electronic base registries records is formalised in legislation

BRIDGING LEGISLATION

Good practice No 2:

Principles of data sharing across sectors are formalised to bridge differences in legislation

SERVICE TERMS AND CONDITIONS

Good practice No 3:

European initiatives provide legal support to ensure that personal data is processed in accordance with individuals' fundamental rights and freedoms

DATA SHARING PRINCIPLES

Good practice No 4:

Legislation regulating base registries uses technology-neutral terms or standards and specifications which are not proprietary

Good practice No 5:

When a common interconnecting infrastructure for base registries is available, legislation is used to force its use

Good practices at **organisational** level

ORGANISATIONAL STRUCTURES

Good practice No 6:

Cross-organisational committees, with decision-making power, coordinate the interconnection between base registries

COLLABORATION

Good practice No 7:

Collaborative processes are put in place to design interfaces used for base registries

SERVICE LEVEL POLICIES

Good practice No 8:

The conditions for accessing data in base registries are formalised in agreements which are respected

GOVERNANCE PROCESSES

Good practice No 9:

Stakeholder engagement is an integral part of the lifecycle of the interconnection of base registries

Good practice No 10:

All base registries have data management in place

BUSINESS MODEL

Good practice No 11:

The owners of base registries have a business model for basic data that promotes its reuse

Good practices at **semantic** level

VOCABULARIES

Good practice No 12:

Base registries are slowly moving towards the reuse of semantic assets

CODE LISTS

GLOSSARIES

Good practice No 13:

EU-wide projects make use of coded values to reduce semantic conflicts

IDENTIFIERS

Good practice No 14:

Entities can be unequivocally identified within the Member State and across borders

Good practices at **technical** level

NETWORK FOR DATA TRANSPORT STANDARD FOR DATA EXCHANGE INTERCONNECTION ARCHITECTURE

Good practice No 15:

Modular, loosely coupled service components are used for interconnecting base registries

SECURITY

Good practice No 16:

User and application access management is based on a federated structure of authorised users and applications

Good practice No 17:

A set of security principles is guaranteed via the appropriate trust-based mechanisms

Figure 23: Good practices on base registries from the European Commission, ISA² Programme

GP#1

Equivalence of paper and electronic base registries records is formalised in legislation: In Spain¹⁷² and Belgium¹⁷³ there is legislation that recognises electronic records as equivalent to the paper version. In Greece, the records of the digital archive of all administrative decisions called Diavgeia (Clarity)¹⁷⁴ have stronger legal validity than their paper version, i.e. in the case of inconsistencies between paper and electronic version, the electronic version is considered valid.

GP#2

Principles of data sharing across sectors are formalised to bridge differences in legislation: Different registries (e.g. citizen, business, land) are generally governed by sector-specific legislation, which may be a barrier to public administrations sharing electronic data across registries or ministries. Common data sharing principles, agreements on governance, accessibility and data quality will lead to improved access to data. Therefore, developing a horizontal, common set of principles or framework is considered important.

172 Law 11/2007, 22/6/2010 on electronic access to Public Services by the citizens

173 Decree 13/07/2012 concerning establishment and organisation of Flemish service integrator

174 <https://diavgeia.gov.gr/>

GP#5

When a common interconnecting infrastructure for base registries is available, legislation is used to force its use: The above-mentioned common framework could be used as a basis for a common interconnecting infrastructure. In some EU countries this infrastructure exists and the recommendation here is that the use of these infrastructures should become mandatory.

All the identified good practices at the organisational level (see Figure 23) are promoting communication and coordination for the design and governance of base registries. GP#6 proposes the creation of inter-ministerial committees, GP#7 stresses on the need for collaborative design of interconnection interfaces, GP#8 urges to provide formal access and use conditions and agreements (e.g. SLAs) between providers and consumer of base registries, GP#9 promotes open specification process with the involvement of all stakeholders, and GP#10 asks for a clear data management plan. Last, GP#11 invites agencies to (re-)consider their business model, taking also into consideration the possibility to provide data to third parties at no cost whenever possible, following the “open by default” principle.

GP#12

Base registries are slowly moving towards the reuse of semantic assets. The lack of semantic interoperability is a major obstacle to the accessibility of base registries information. Base registries use often different models/metadata for even basic information, such as a person’s first and family name(s). Unless semantic conflicts are resolved, base registries cannot interoperate. The use of common semantic standards is the solution to this problem (Peristeras, 2013). In Europe, there are efforts to establish cross-domain and generic data standards for important entities usually linked with base registries like person, business, location, service. For more information, please check the work relevant to the ISA Core Vocabularies¹⁷⁵.

GP#13

EU-wide projects make use of coded values to reduce semantic conflicts. Actually, this good practice is a special type of the previous: semantic standards can take the form of standardised metadata, vocabularies, thesauri, taxonomies and classification and code lists. Code lists are also usually called “reference data”. The need for harmonisation and standardisation for reference data is essential for promoting data sharing and interoperability. The MDR described above is exactly a good practice in this specific area.

GP#14

Entities can be unequivocally identified within the Member State and across borders. This practice highlights the important of unique and persistent identifiers for important data stored in base registries. For more details on the topic of identifiers, with reported best practices from Europe and recommendations, please see the study available here¹⁷⁶. A summary of recommendations for persistent unique identifiers can be found in the figure below.

¹⁷⁵ <https://joinup.ec.europa.eu/collection/semantic-interoperability-community-semic/core-vocabularies>

¹⁷⁶ <https://joinup.ec.europa.eu/sites/default/files/document/2013-02/D7.1.3%20-%20Study%20on%20persistent%20URIs.pdf>

10 Rules for persistent URIs

 **Follow the pattern**
e.g. `http://(domain)/(type)/(concept)/(reference)`

Re-use existing identifiers
e.g. `http://education.data.gov.uk/id/school/123456`

Link multiple representations
e.g. `http://data.example.org/doc/foo/bar.html`
e.g. `http://data.example.org/doc/foo/bar.rdf`

Implement 303 redirects for real-world objects
e.g. `http://www.example.com/id/alice_brown`

Use a dedicated service
i.e. independent of the data originator

 **Avoid stating ownership**
e.g. `http://education.data.gov.uk/ministry/education/id/school/123456`

Avoid version numbers
e.g. `http://education.data.gov.uk/doc/school1/123456`

Avoid using auto-increment
e.g. `http://education.data.gov.uk/id/school1/123456`
e.g. `http://education.data.gov.uk/id/school1/123457`

Avoid query strings
e.g. `http://education.data.gov.uk/doc/school?id=123456`

Avoid file extensions
`http://education.data.gov.uk/doc/school1/123456.c#`

Figure 24: Recommendations for Persistent Unique Identifiers (EC/ISA Programme)

GP#15

Modular, loosely coupled service components are used for interconnecting base registries. This approach promotes the use of Service Oriented Architectures (SOA) to allow flexible connections, while leaving the ownership and governance of separate registries to the competent authorities.

Recommendation 37:

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

Recommendation 38:

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

Recommendation 39:

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

Recommendation 40:

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

Figure 25: Recommendations for Base Registries from the European Interoperability Framework

In addition to the above discussed good practices, the European Interoperability Framework (EIF)¹⁷⁷ presents a set of recommendations for base registries. These appear in Figure 25 and commented below.

Rec. 37 is a general recommendation to promote the reuse of master data in the public sector via providing access to base registries.

Rec 38 promotes accessibility and machine-readability for the base registries. It also promotes the development of well-documented APIs.

Rec 39 promotes the use of metadata to describe the content and access conditions.

Rec 40 is about data management and emphasises on the importance for base registries to provide high quality data.

7.3 Recommendations

In this part, we present recommendations to be considered in drafting similar policies in the Brazilian context. The recommendations mainly come from the good practices presented above, the European Interoperability Framework and other relevant work conducted by the European Commission and EU Member States.

¹⁷⁷ https://ec.europa.eu/isa2/eif_en

7.3.1 Open data

1. **Publish the data you own as open data unless certain restrictions apply.** This is a call for applying the “open-by-default” principle.
2. **Define and promote corporate information frameworks¹⁷⁸ and include there an open data governance plan.** Open data should become part of the corporate information and data management policy.
3. **Establish procedures and processes to integrate the opening of data in your common business processes, working routines, and in the development of new information systems.** As part of the above-mentioned policy, open data should be included as part in the initial architectural and information design.
4. **Use common semantic standards to describe open government data:** In a big and federated country like Brazil, with multiple agencies acting at federal, state, regional and local level, it is very difficult, even not possible due to legal constraints, to impose technologies, approaches and policies for open data. Nevertheless, it is possible to agree for the use of a common specification for describing the published dataset can provide a common language. It is important that a national standard exist. Consider using a DCAT-based AP as to promote interoperability at the international level.
5. **Create a central catalogue/registry as a single access point for open data:** the agreement on common semantics to describe open datasets can be exploited at the central level to create a registry infrastructure that keeps only metadata about what the open datasets are about and where they are stored. The data stays where it is produced and stored, but users can query all open data from a point of single access.
6. **Publish open data in machine-readable, non-proprietary formats.** Ensure that open data is accompanied by high quality, machine-readable metadata in non-proprietary formats, including a description of their content, the way data is collected and its level of quality and the license terms under which it is made available. The use of common vocabularies for expressing metadata is recommended.
7. **Funding and costs:** Do not underestimate the costs for publishing open data of high quality. Calculate carefully the upfront investment costs. There might also be a need for long-term commitment of resources.
8. **Licensing and privacy.** Always publish open data with a clear reuse license. Whenever possible use a standardised license. Users will be reluctant to reuse open data without a clear license, especially for commercial reasons.

7.3.2 Metadata

1. **Create a metadata catalogue at the federal level and make its use mandatory.** All ministries and agencies should use the metadata sets published in the catalogue. A comply-or-explain policy promotes reuse of common metadata and standards.
2. **Develop and document a clear metadata management governance and process:** In inter-organisational contexts, where different stakeholders participate in metadata governance and management, the need for clear and

¹⁷⁸ See for example the Corporate Information Management Framework (CIMF), <https://joinup.ec.europa.eu/news/luxembourg-adopts-cimf>

complete documentation of practices, process, principles, roles and responsibilities is recommended. Having stable and transparent processes improves the efficiency of the process itself, and sets a common ground for operating metadata management, taking decisions and resolving conflicts.

3. **Legislation should be formulated on a sufficiently high level and should not specify details like the values in a code list or the elements of a data model.** Technical specifications and standards can soon become obsolete, while legislation is usually difficult to change.
4. **Structural metadata should have persistent unique identifiers.** To facilitate its sharing and reuse across systems and organisation, structural metadata needs to have persistent unique identifiers. It is recommended that such identifiers come in the form of HTTP URIs. The EC/ISA Programme as well as W3C have created good practices and guidelines for the design and management of well-formed, persistent URIs.
5. **No single tool exists that can cater for all different requirements of metadata governance and management. A collection of different tools needs to be deployed.** It is important that these tools are based on open standards and are interoperable. The toolset should cater the following functionalities:
 - Provision of an authoritative source for metadata, which allows for storing the metadata and its documentation, and offers search, visualisation and browsing functionalities.
 - Issue tracking and ticket management to manage metadata changes.
 - Version control.
 - Maintenance and linking to support metadata harmonization.
6. **Support the establishment of sector-specific and cross-sectoral communities that aim to create or agree upon open information specifications** including metadata schemata, vocabularies, thesauri and codelists.
7. **Put in place an information management strategy at the highest possible level** to avoid fragmentation and duplication. Management of metadata, master data and reference data should be prioritised.

7.3.3 Masterdata

To avoid repetition, for Master Data management, we propose the set of recommendations include in Figure 23, where the recommendations from the European Community of Practise on Base Registries are summarised and from Figure 25 where the recommendations from the European Interoperability Framework for Base Registries can be found. References to the sources can be found in part “7.2.3.2 Good practices in Master Data management”.

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8 Overview of Recommendations

In this part, we collect together and summarise all the 112 recommendations from the various parts of this document grouped according to the different parts of the survey

I. General recommendations for service portals

1 Service catalogs and organisation of content

- 1.1 Start with shallow portals to start cataloguing what services exist. Continue by integrating service descriptions in a central point.
- 1.2 Promote common service descriptions and visual templates for descriptions of eservices across the government.
- 1.3 Organise centrally services in logical bundles.
- 1.4 Start creating a service portfolio by making service relationships explicit.
- 1.5 Support the service descriptions with contextual information.
- 1.6 Use existing metadata standards to describe public services, e.g. CPSV.

2 Portal and webpage design

- 2.1 Utilize modern data publishing and interactive visualisation platforms
- 2.2 Use mobile-friendly design for all portal pages
- 2.3 Use explanatory videos whenever necessary.
- 2.4 Support real-time interaction with web chats applications.
- 2.5 Provide clear, open by default licensing information for resources and data.
- 2.6 Provide multilingual support wherever relevant.
- 2.7 Respect accessibility standards.
- 2.8 Include in each portal page: feedback mechanisms, "date modified" info, "share this page" "add to my links", "send to a friend", "print" features.

3 Personalization

- 3.1 Provide unique e-Identification for all citizens and companies.
- 3.2 Enable personalised access to the portal.
- 3.3 Exploit users' profiles to provide personalised services.
- 3.4 Give the possibility to the citizens to check what data public administration keeps for them. Provide also access information to this data.
- 3.5 Create central electronic inbox service for messages coming from public agencies.
- 3.6 Allow each citizen and company to store and check all the documents that have been exchanged with public authorities.

4 Central Catalogues

- 4.1 Create central portals for: services, public organisations, e-consultations, performance and monitoring information, legislation, administrative decisions, open data, standards.
- 4.2 Create a global entry page providing access and explaining the purpose and value of all the above portals.

- 4.3 Document and publish the government structure.
- 4.4 Create a central point for promoting eParticipation where all consultations, citizens and co-creation initiatives can be found.
- 4.5 Create a central Open Data portal, publish open data in machine-readable formats using open standards e.g. DCAT.
- 4.6 Create a portal space to monitor performance and results.
- 4.7 List in one central place all governmental social media accounts, apps, media-releases.
- 4.8 Create an official API catalog for the available connections to existing systems.
- 4.9 Develop a common and horizontal data sharing infrastructure (enterprise or service bus) across all departments and agencies to enable the exchange of data.

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II. Recommendations for citizens' participation

- 5.1 It is important that online citizen participation is understood and realized as a true component of the democratic and participatory process. It is useful for such projects to be design and implemented not simply as an e-government project but as equal access and direct democracy projects.
- 5.2 Long term planning and whole-of government approaches significantly aid meaningful citizen participation. Establishing central agencies that are responsible for citizen feedback and participatory process adoption and co-ordination can improve feedback quality, relevance and utility.
- 5.3 Participation efforts themselves should be submitted to peoples review and examination and should be co-created through citizen feedback. Meaningful engagement with citizens should avoid taking the form of "arms-length instruments such as surveys.
- 5.4 Taking advantage of already existing structures such as the Open Government Partnership OGP can leverage citizen participation via the biannual OGP action plans. Using OGP monitoring and evaluation tools to maintain quality of citizen participation initiatives. The OGP Participation and Co-creation Toolkit can be a guide for designing and implementing citizen participation efforts.
- 5.5 Creating government labs that oversee participation and co-creation efforts can leverage relevant expertise and guide efforts across the civil sector. The UK Policy Lab toolkit is an extremely useful resource that can be used to initiate user need mapping and guide co-design of policies and services.
- 5.6 When using central online participation portals grouping the information along thematic axes and making sure all citizens groups (e.g. youth, minorities, senior citizens) are represented significantly aids the participatory process.
- 5.7 Adoption of dashboards application for presenting sometimes complex government information on activities and services can improve citizen participation and reporting as well as foster competition between the participating entities.
- 5.8 Utilizing existing open source tools and civic participation platforms like Consul that have reached the critical mass necessary to be supported by large implementer and user communities can assist governments in reducing implementation costs and risks.

III. Recommendations for advanced technology for service platforms

6 User Interface

- 6.1 The portal design should promote clear layout, with simple color schemes, use of same CSS (cascading stylesheets) across whole site.
- 6.2 The portal design should support responsive design and mobile support for all pages of the portal.
- 6.3 The portal design should support for font sizing/flexibility through either the interface or the browser. Portal should support other languages.
- 6.4 The portal should provide rich media and/or audio support in order to deliver its content following WCAG 2.0.

7 Architecture

- 7.1 The portal should ideally use well-known, supported and stable software used for server (e.g. Apache on Ubuntu).
- 7.2 The portal should ideally use well-known, supported and stable software used for the platform (e.g. Drupal).
- 7.3 The portal should ideally use open source software modern, supported and not outdated.
- 7.4 The portal for login or user accounts should be integrated with the basic portal supporting the same architectural and design choices.

8 Communication:

- 8.1 The portal should provide a unique identification mechanism for the user to login.
- 8.2 The portal should support service delivery through various means digital and not.
- 8.3 The portal should support social media integration by either sharing or following governmental accounts.
- 8.4 The portal should allow for both push and pull communication mechanisms. This is supported by registration forms, providing e-mail or even phone numbers of the user in order government to inform him/her upon needs. The portal should support alerts and notifications to the user. A common example is following a page or registering to a newsletter.
- 8.5 The portal should provide support mechanisms to the end-users (e.g. helpdesks, way to communicate e.g. forms, e-mails, chats etc.)
- 8.6 The portal should ideally facilitate provision of an e-letter box account for the user. This could be a personal account where the user can see all his/her requests, historical service requests, subscriptions to alerts etc.

9 Evaluation:

- 9.1 The portal should provide feedback mechanisms available to the users. These feedback mechanisms can be a form and should ideally provide motivation in order not to be anonymous.
- 9.2 The portal should support mechanisms that take into account feedback from the user (citizen/business). For example, a site could inform users that 20% of the users have voted that X service has to be changed in Y aspect. This actually re-uses web analytics data.

- 9.3 The portal should have facilities to analyze available data (if any) concerning the service portal evaluation from user (citizen or business) perspective. For instance, a site may inform users that the mean delivery time of the service is X, thus making the user knowledgeable of what to expect.

10 Usability:

- 10.1 The portal should cater accessibility issues. For instance, using an audio assistant service, users have the possibility to listen what is included in the whole page or highlight sentences/parts of the text and listen via an embedded to the portal audio assistant application.
- 10.2 The portal should provide high-level of user-friendliness. For instance, capability to change font sizes and colors of the web page are attributes that leverage user-friendliness. Easy navigation mechanisms like “breadcrumbs” techniques are also considered assets of web page design.
- 10.3 The portal should support the easy finding of a service and its description. Organization of services under categories similar to the idea of life-events promotes user satisfaction and easy service discovery.
- 10.4 The portal should support friendly, quickly, and simple browsing through service portal content. For instance, provision of service metadata and facilitation of search under various facets.

11 Interinstitutional:

- 11.1 The portal should provide descriptions making service execution transparent, especially when the delivery of a service involves more than one department that should collaborate.
- 11.2 The portal should provide information about which connections and dependencies of a service to other services exist. A way to provide such information is through the service descriptions where links between services, or links between services and the life-events can be documented and explained.
- 11.3 The portal should provide information about cost and duration of service delivery along with integration mechanisms to services that are relevant.

IV. Recommendations for notifications and communications with users

- 12.1 Simple digital sign-on of the user for all services
- 12.2 Support all channels of communication (whether digital or not)
- 12.3 Have an updated social media presence to inform and take feedback from society
- 12.4 Apply pro-active eGovernment by informing users according to their needs (e.g. newsletters)
- 12.5 Provide various means to support users fulfill their needs (besides simple information navigation through a portal)
- 12.6 Use a single user e-letterbox along with eID method to facilitate a digital “folder” of transactions, data and documents

IV. Recommendations for analytics tools

13 For policy and organisational initiatives

- 13.1 Promote a data-centric culture, data-driven administration, and evidence-based policy making.
- 13.2 Draft a national data strategy. A strategy for using analytic tools, business intelligence tools along with specific objectives and KPIs should be documented. The methodology and model we have presented in this chapter can assist in this effort.
- 13.3 Give motivation for organizations to publish data in machine-readable formats.
- 13.4 Engage government staff and citizens on benefits of analytics. This can be achieved by platforms that provide analytics' data as open and public datasets (e.g. through data platforms like CKAN). Moreover, business intelligence tools that facilitate building of data stories with examples and guides is always a good idea to start with.
- 13.5 Invest on building teams and knowledge around data science and analytic tools. Teams should be established, provided with resources and education on data science and analytic tools usage.
- 13.6 Organize data-centric efforts using a business-driven approach. Usage scenarios and benefits presented in the first section of this chapter can help in this direction.
- 13.7 Fine tune services based on analytics, business intelligence analysis and forecasting. This is actually closely closing the feedback loop by re-engineering public services according to analytic and other big data collected. Tools used here usually are off-line tools like Hadoop, SPSS etc.
- 13.8 Prioritize service data usage analysis by setting goals of e-government against user satisfaction.
- 13.9 Draw a specific plan of objectives, KPIs and tools to be used. The tabular model we presented in the second section of this chapter can help in this direction.

14 For technologies and tools

- 14.1 Attempt to create and store data on the first place e.g. through automated processes with monitoring mechanisms.
- 14.2 Provide analytics data and e-government data as self-service BI. This means that tools should be made open, freely and easily accessible and configurable by end-users, whether public servants or citizens themselves. This allows government to become gradually transparent and users can contribute to building data stories and applications.
- 14.3 Use open source tools as there exist ones that can help in this task (e.g. Matomo).
- 14.4 Implement advanced analytic capabilities for services e.g. user behavior deep tracking by using tools like HotJar, rather than simple analytics tracking.
- 14.5 Reassure plans for data quality and data interoperability e.g. common data standards and formats.
- 14.6 Determine standards and techniques for analytics data privacy usage e.g. clearly define how user navigation data are used, document data privacy, ask for permission to utilize web analytics data through cookies etc.

V. Recommendations for data management

15 Open data

- 15.1 Publish the data you own as open data unless certain restrictions apply. This is a call for applying the “open-by-default” principle.
- 15.2 Define and promote corporate information frameworks and include there an open data governance plan. Open data should become part of the corporate information and data management policy.
- 15.3 Establish procedures and processes to integrate the opening of data in your common business processes, working routines, and in the development of new information systems. As part of the above-mentioned policy, open data should be included as part in the initial architectural and information design.
- 15.4 Use common semantic standards to describe open government data.
- 15.5 Create a central catalogue/registry as a single access point for open data.
- 15.6 Publish open data in machine-readable, non-proprietary formats.
- 15.7 Funding and costs: Do not underestimate the costs for publishing open data of high quality.
- 15.8 Licensing and privacy. Always publish open data with a clear reuse license.

16 Metadata

- 16.1 Create a metadata catalogue at the federal level and make its use mandatory.
- 16.2 Develop and document a clear metadata management governance and process.
- 16.3 Legislation should be formulated on a sufficiently high level and should not specify details like the values in a code list or the elements of a data model.
- 16.4 Structural metadata should have persistent unique identifiers.
- 16.5 No single tool exists that can cater for all different requirements of metadata governance and management. A collection of different tools needs to be deployed. It is important that these tools are based on open standards and are interoperable.
- 16.6 Support the establishment of sector-specific and cross-sectoral communities that aim to create or agree upon open information specifications including metadata schemata, vocabularies, thesauri and codelists.
- 16.7 Put in place an information management strategy at the highest possible level to avoid fragmentation and duplication. Management of metadata, master data and reference data should be prioritised.

17 Masterdata (based on the EC/ISA Programme Good Practices)

Legal level

- 17.1 Equivalence of paper and electronic base registries records should be formalized in legislation
- 17.2 Principles of data sharing across sectors should be formalized to bridge differences in legislation
- 17.3 Legislation regulating base registries should use technology-neutral terms or standards and specifications which are not proprietary

- 17.4 When a common interconnecting infrastructure for base registries is available, legislation should be used to force it

Organisational level

- 17.5 Cross-organisational committees, with decision-making power, should coordinate the interconnection between base registries
- 17.6 Collaborative processes should be put in place to design interfaces used for base registries
- 17.7 The conditions for accessing data in base registries should be formalized in agreement which are respected.
- 17.8 Stakeholders engagement should become an integral part of the lifecycle of the interconnection of base registries
- 17.9 All base registries should have data management in place
- 17.10 The owners of base registries should have a business model for basic data that promotes its reuse

Semantic level

- 17.11 Base registries should moving towards the reuse of semantic assets
- 17.12 Cross-institutional projects should make use of coded values to reduce semantic conflicts

Technical level

- 17.13 Modular, loosely coupled service components should be used for interconnecting base registries
- 17.14 User and application access management should be based on a federated structure authorized users and applications
- 17.15 A set of security should be guaranteed via the appropriate trust-based mechanisms

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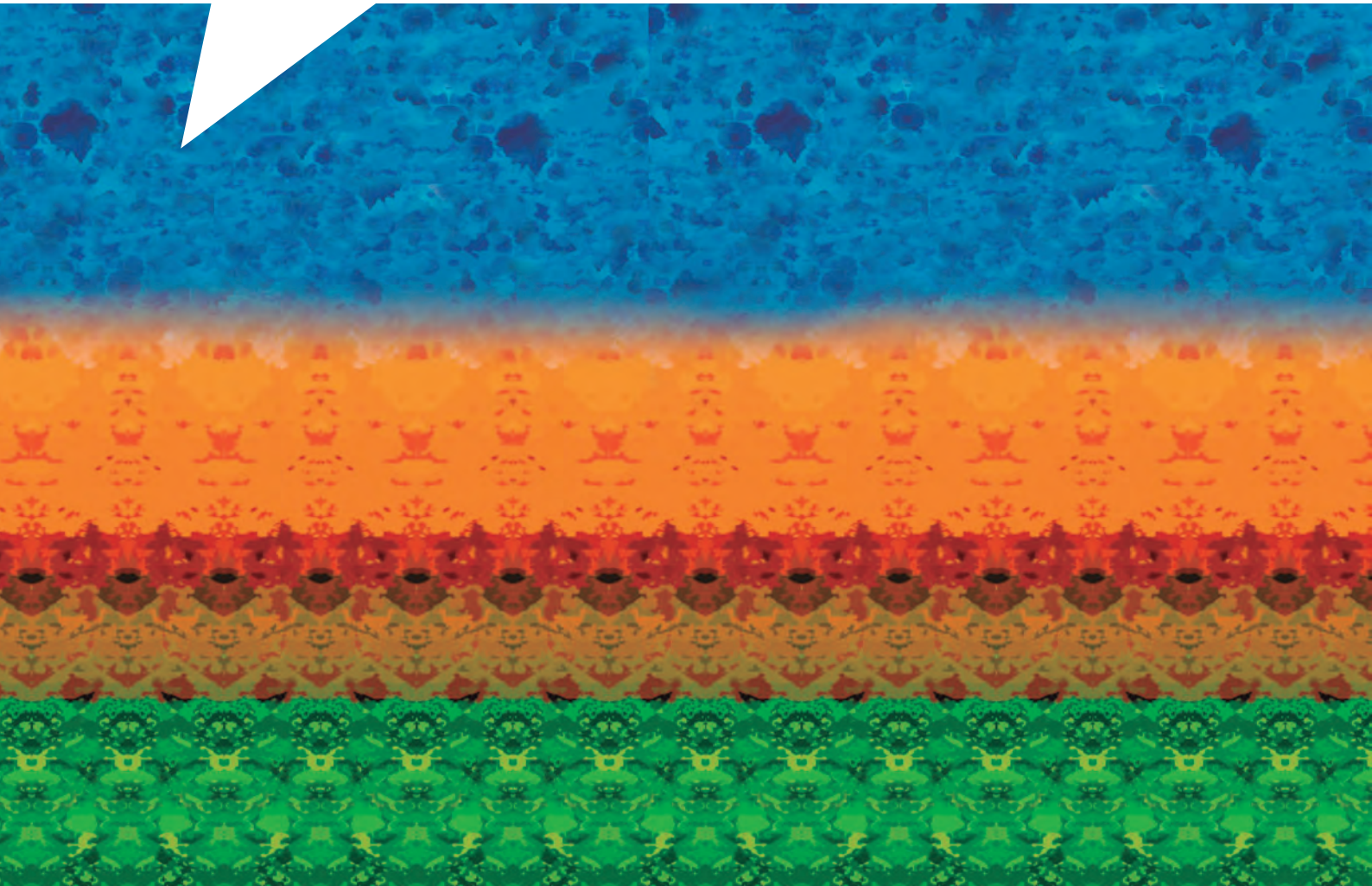


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