European Commission

The Sharing and Reuse Framework for IT Solutions

Fostering collaboration among public administrations

ISA²

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Introduction

Governments and public administrations, as important contributors to economic growth [1], are under continuous pressure to perform more efficiently, deliver faster and cheaper services and meet citizens' and businesses' needs more effectively.

The European Commission's Digital Single Market Strategy recognises that digital technologies have great potential to help public administrations deliver better services for less [1]. In order to fully exploit this potential, it is necessary to facilitate electronic interactions between public administrations, citizens and businesses, not only at national level, but also across borders and sectors [2]. For this purpose, the European Commission has developed the European Interoperability Framework (EIF) [2], which provides guidance and recommendations to European public administrations on how to implement and deliver more interoperable and better quality public services. Reusability is one of the fundamental principles of the EIF and **'sharing and reuse' of IT solutions** is a necessary condition for **interoperability** to apply in practice in a Digital Single Market, where citizens and businesses can seamlessly access public services and undertake activities online, irrespective of their nationality or Member State of residence.

In the context of this document, '**IT solutions**' should be read as **software** [3] and **IT services** [4] supplied by European public administrations either to one another or to business and citizens in the Union.

Some public administrations and governments across the EU already promote the sharing and reuse of IT solutions when deploying digital service infrastructure, by adopting new business models [3] and promoting the use of open source software for IT services [4]. However, there is still room for improvement, as a number of barriers still need to be tackled, namely:

Organisational barriers: fragmented IT infrastructure due to obsolete business models that do not allow for coordination between public administrations in the design, procurement and operation of IT solutions;

Legal barriers: uncertainty about the limitations of and exceptions to intellectual property rights (IPR) coupled with the fact that IT requirements are not considered early enough in the policy-making lifecycle;

Technical barriers: issues like the limited use of common standards, poor documentation and the prevalence of monolithic [5] IT development, which reduce the reusability of IT solutions;

Communication barriers: lack of awareness of available IT solutions serving common needs, combined with the difficulties of operating in a multilingual environment.

[1] The public sector accounts for over a quarter of total employment and contributes to approximately a fifth of the EU's GDP through public procurement.

[2] 'Sector' should be read in this document as a self-contained policy or administrative level.

[3] 'Software', in this context, is a complete IT system, application, tool or module thereof.

[4] 'IT service', in this context, is any public service delivered digitally/online to business and citizens, nationally and/or across borders.

[5] Single tier, shelf-contained, non-interoperable

To help EU, national, regional and local public administrations overcome these barriers, this document presents the **Sharing and Reuse Framework for IT Solutions (SRF[6])**, which includes **ten generic recommendations** on how to reuse, share or jointly develop IT solutions that meet common requirements.

Decision makers, legal professionals, IT architects, IT developers and communication experts should take it into account when:

- reusing an existing software;
- sharing software after it has been developed;
- reusing an existing IT service;
- sharing the provision of an IT service;
- collaborating on the development of a software or an IT service;

Public administrations should follow the SRF recommendations throughout the lifecycle of each IT solution; from its inception, design and development through to maintenance. Furthermore, it is important that central bodies[7] support this process by creating a climate of innovation in their administrations, encouraging staff to take an active role in the process and promoting the use of information and communication technologies. To facilitate the implementation of the proposed recommendations, the SRF also includes **nineteen measures** specifically for central bodies.

By promoting the sharing and reuse of IT solutions, public administrations and central bodies improve the interoperability of their IT systems and services, which saves money and increases the quality of eGovernment services. All of this contributes to the development of the EU Digital Single Market and strengthens the EU's position as a world leader in the digital economy.

[6] The Sharing and Reuse Framework for IT Solutions was developed under the European Union's ISA Programme (Interoperability Solutions for Public Administrations) [20].

[7] Central bodies are entities with a coordination, governance or legislative/policymaking role, such as central or regional governments and agencies, or EU institutions.

Structure of the recommendations

The Sharing and Reuse Framework for IT Solutions includes ten recommendations that relate to each of the four identified barriers. Each recommendation is structured as follows:

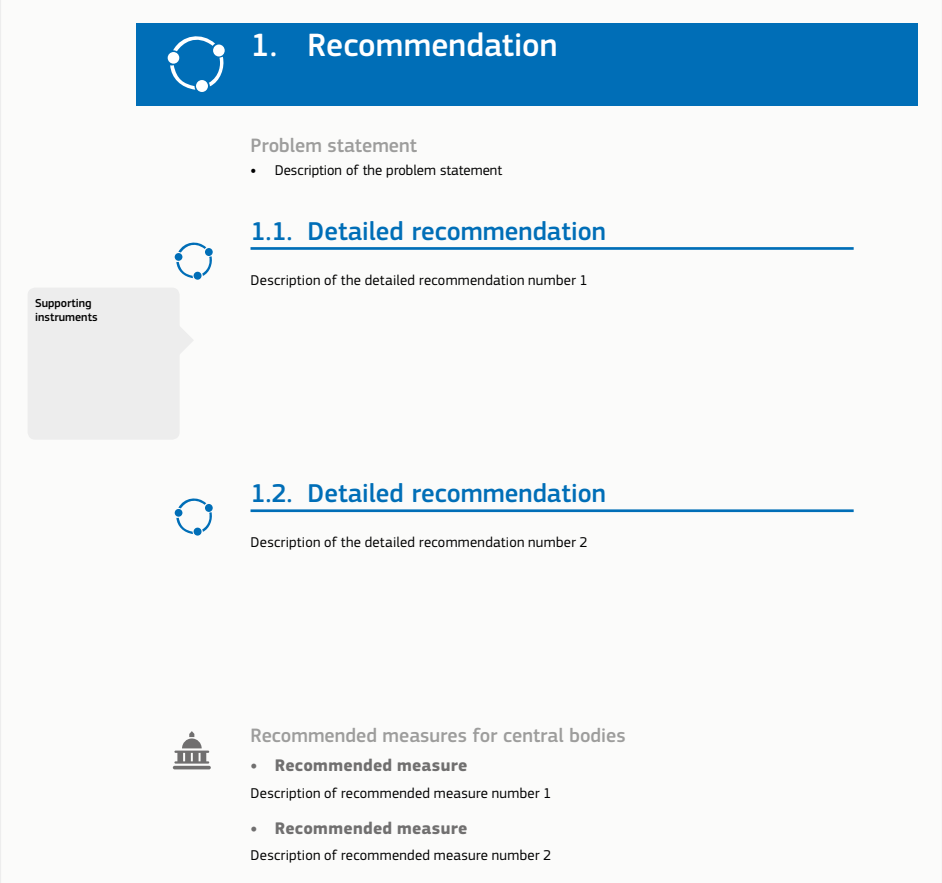
Generic recommendation: broad recommendation to public administrations at every administrative level on how to overcome a barrier that prevents them from sharing or reusing IT solutions.

Detailed recommendation: specific, more in-depth recommendation to public administrations at every administrative level on how to overcome a barrier that prevents them from sharing or reusing IT solutions.

Supporting instruments: these are good examples of initiatives and solutions offered by the European Commission, Member States and/or various organisations, which can help implement the recommendations of this framework.

Recommended measures for central bodies: these are proposed activities to be undertaken by central bodies to support their administrations in implementing the recommendations of this framework.

Figure 1 — Structure of recommendations



1. Enhance cross-organisation coordination

Context

Public administrations rely on IT solutions of different sizes and complexity to carry out their day-to-day work. Traditionally, they have designed, procured and maintained their IT solutions. This is true at cross-border level and within countries, especially in Member States organised in federal or decentralised structures of government.

In many cases, this means greater autonomy but it can also contribute to an expensive and fragmented IT infrastructure, which often duplicates IT solutions and impedes sharing and reuse.

Although there is a clear need for a new approach, public administrations rarely consider co-creation and have difficulties with coordinating work across organisations at different levels of government. The following are among the most prominent reasons hampering coordination:

- Limited awareness of similar activities across different sectors. Administrations may put parallel work into developing IT solutions that meet similar business needs across borders or different sectors due to insufficient exchange of information and limited or non-existent coordination.
- Lack of a cross-organisational IT governance structure. This can reduce the pace and efficiency of reusing common IT solutions due to the lack of coordination and alignment among administrations responsible for the development of IT solutions.

1.1. Adopt cross-organisation IT governance

Cross-organisation IT governance, in other words an approach that involves common or tightly-coupled governance schemas for the different organisational entities, can help public administrations implement public services and eGovernment systems faster and more efficiently.

The European Commission provides a number of IT governance models in two key documents: The Business models for sharing and reuse [3] and the Governance Models for sharing and reuse of IT Solutions. [7]

By adopting cross-organisation IT governance, public administrations enable the alignment and streamlining of their business processes supported by common IT solutions. Such a structure can also increase the overall efficiency of IT spending by eliminating the duplication of work and focusing on developing solutions that satisfy common needs. Moreover, it increases service quality and strengthens accountability, as only one entity is responsible for developing and delivering a solution, its change management, sharing process, support, etc.

1.2. Follow guidelines and templates when drafting collaborative agreements

The European Commission has developed Guidelines and templates for agreements between public administrations to be used when sharing and reusing IT solutions. [8]

Collaborative agreements are a useful tool for establishing long-term partnerships between public administrations, using resources in an effective and economical way and ensuring that involved parties accept mutual benefits as a goal.

However, writing and negotiating a collaborative agreement may be a difficult, costly and lengthy process, which could result in agreements that do not cover all aspects of a collaborative project, such as responsibilities, handling of complaints, project change control or intellectual property rights. In turn, this may hamper an otherwise harmonious relationship and, consequently, affect the degree of trust between public administrations.

Following **guidelines and standard templates** when drafting agreements for collaborative development, maintenance or use of IT solutions between different public administrations, helps to increase the level of trust. Standard templates typically cover different elements of collaboration, such as:

- the structure and recommended content of service level agreements;
- financial terms of the agreement (charging method, invoicing, payment terms);
- liabilities and IPR;
- project change control, governance, responsibilities;
- contributors agreements (in case of collaborative developments).

Recommended measures for central bodies

- **Coordinate IT governance within and across Member States**

It is preferable to put in place an IT governance structure that aims to align the different levels of administration within a Member State (for instance federal, regional, local government) and between Member States, taking into account their respective IT policies, needs and capabilities.

2. Collaborate to identify common needs

Context

Both European and national legislation often specify common high-level needs as well as technical and semantic (data) requirements or specifications. However, these are rarely accompanied by the description of elements, such as lower-level collaboration structures and workflows, data models etc., which could be used by administrations either when developing new or migrating existing IT solutions[8].

While these IT needs and requirements may be the same in various countries or organisations, collaborative development and the reuse of IT solutions can be hampered by the fact that public administrations are often not aware of this.

Generally, public administrations' lack of awareness of others' IT needs hinders the identification of generic requirements, thus limiting the possibility of collaborating on the development of common IT solutions.

2.1. Communicate your needs

A key factor in the successful development of common and broadly reused IT solutions is the extent to which they meet, or can be adjusted to, the business needs of various organisations.

In order to increase awareness about existing needs and requirements, public administrations should communicate those to other public administrations and potential vendors as early as possible in the process. This will facilitate the alignment of development work.

2.2. Define sets of requirements supporting common business processes

Public administrations across borders and sectors should work together to identify business processes serving common needs and subsequently define common sets of requirements for IT solutions implementing those business processes.

[8] The Services Directive (2006/123/EC) is an example of EU legislation that led to common needs for IT solutions (Points of Single Contact) in Member States [11].

2.3. Identify generic functionalities that can be used in multiple solutions

Public administrations should work together to identify generic functionalities, such as a set of abilities or functions, which can be implemented as common building blocks and reused in various IT solutions; for example, single sign-on, document transfer, archiving, etc. See recommendation 6 for further information on **building blocks**.

Recommended measures for central bodies

- **Provide a Forum where public administrations can exchange information**

Central bodies should establish and maintain a forum where public administrations can exchange information about their needs, requirements and existing or planned IT solutions.

- **Support the harmonisation of business processes when implementing new legislation**

Central bodies should identify, describe and publish common business processes for IT solutions that will implement new policies or legislation, in order to reduce implementation time and effort. The common processes should be made public by the time the legislation is adopted.

3. Adopt business models that facilitate sharing and reuse

Context

Budget fragmentation and shrinking budgets make it more difficult for public administrations to co-create/develop IT solutions together. The individual administration's mandate usually does not include creating value for other administrations and this is an additional reason for the limited appeal of joint development. Another challenge is relinquishing old applications with multiple (inter)dependencies. The cost of phasing out and replacing entrenched solutions deters public administrations from exploring alternatives. Furthermore, developing, using and maintaining a reusable solution requires extra work, for instance to deliver better documentation or adjust workflows, as well as specialised resources for reuse and customisation, while the benefits (i.e. the sharing of work needed to sustain the solution) are often enjoyed only later on. The necessary resources and expertise can be difficult to find in most administrations as most are local and have limited numbers of staff.

However, by not engaging in co-creation, public administrations may incur higher costs, face more development work, and miss out on opportunities to ensure the long-term sustainability of their IT solutions.

3.1. Apply business models that facilitate the co-creation, sharing and reuse of IT solutions

A number of **business models** enable the delivery of public services based on the sharing of IT solutions and linked services, such as support or procurement. These business models cover different forms of collaboration, including: the development of reusable IT solutions; the method and conditions for sharing IT solutions; the reuse of shared IT solutions.

A list of successful business models is available on the Joinup.eu platform and includes, among others, shared development of IT solutions by the European Commission. [3]

Public administrations should choose and describe the most appropriate business model for them, taking into account the form of cooperation (i.e. common development, common provision of a service, etc.) and business needs.

For example, by adopting a common approach to procurement, public administrations can increase value for money and save on costs through improved planning and coordination across organisations, less duplication of work and sharing of both experience and IT solutions. The development and provision of shared services can also generate efficiency and financial gains.

3.2. When assessing the total cost of ownership (TCO) of an IT solution, take into account costs related to its end-of-life management

The TCO is a financial estimate intended to help calculate the short- and long-term costs of any solution by taking into account the complete costs from purchase to disposal. In the context of procurement, public administrations typically assess costs related to the following:

- acquisition and procurement, such as upfront evaluation, purchase price, licences, and hardware;
- operation and management (of content, user roles, etc.), upgrades, support services, training and software scaling;
- change management, such as integration, customisation and corrective maintenance.

Costs related to the end-of-life management of legacy IT solutions, such as migrating data to another IT solution, should not be anticipated.

3.3. Consider making your IT solution available as Software as a Service (SaaS)

SaaS can help smaller public administrations to bridge knowledge and resource gaps by outsourcing the development, implementation, customisation, operation and change management of an IT solution to another entity. SaaS is a viable alternative with distinct benefits:

- higher reuse potential;
- time and cost savings for administrations developing a SaaS solution together;
- higher scalability and better integration with other (SaaS) offerings.

Recommended measures for central bodies

- **Support projects with high potential for sharing and reuse**

Central bodies should support public administrations that run projects with high potential for sharing and reuse. A good way to motivate public administrations with similar needs and requirements to work together is, for example, to provide financial incentives to jointly develop IT solutions, which would create benefits for both sides.

- **Implement business models that encourage public administrations to pool their resources**

Central bodies should implement business models that encourage public administrations to use common pools of resources when developing and/or procuring common IT solutions.

- **Provide specialised resources**

Central bodies should not only pool resources but ensure the availability of specialists in different areas, i.e. project managers, business analysts, enterprise architects, security experts, service managers, interoperability experts, etc. These specialists should work across different public administrations applying the same methods and practices, depending on needs.

4. Promote legal certainty

Context

Uncertainty with regard to the liability exposure of relevant stakeholders and the infringement of property rights assigned through, for example, copyright and patents, negatively impact the sharing and reuse of IT solutions.

In order to reduce the degree of legal uncertainty about intellectual property rights' limitations and exceptions, public administrations are encouraged to follow the recommendations listed below.

4.1. Use standard templates for liability agreements

The European Commission has developed Guidelines and Templates for Agreements between public administrations [9] to support administrations working on collaborative IT projects.

To facilitate collaborative software development and cooperation between project partners, the use of **standard templates for liability agreements** is recommended.

Standard templates are practical tools such as licence, consortium and collaboration agreements. These templates make it easier for public administrations to adopt the suitable approach to intellectual property rights and licensing of IT solutions, which, in turn, increases the potential for their sharing and reuse.

4.2. Decide the type of rights' attribution approach to be used as early as possible and inform all involved

The use of **certificates of origin and collaboration agreements** provides developers with guidelines on the requirements to be followed when contributing to the development and maintenance of IT solutions. It also ensures that the guardian of a project's output has the necessary ownership or rights over all contributions to ensure further distribution under the chosen licence. It is important that rights are attributed as early in the process as possible because later amendments may prove difficult or impossible. Clarity on the attribution of rights provides consumers with some form of legal assurance of the provenance and integrity of their contribution.

The joint development of IT solutions can be successful with either a central or decentralised control structure although each approach has its limitations. For instance, where there is central control of intellectual property rights, better

coordination is achieved but it is possible that developers are discouraged from contributing. Where developers are allowed to retain property rights, they are motivated to contribute but issues of control over the broad IT solution may arise.

Additional constraints should also be taken into account. For instance, it is often technically impossible for public administrations to give away rights.

4.3. Use existing open source software licences to share your IT solution

The European Union Public Licence (EUPL) is the first European free/open source software (F/OSS) licence that makes it possible for software to be freely used, modified, and shared. [12]

Public administrations should use licences with the least legal friction possible, i.e. with the minimum possible restrictions in terms of sharing and reuse of software. This is best done by using **open source licences**, such as the EUPL.

Furthermore, to limit incompatibilities between licences and promote legal interoperability of IT solutions, public administrations should reuse existing licences instead of writing their own.

4.4. Detect licence compatibility issues

The European Commission offers an online licence wizard to help administrations find the most appropriate licence to distribute their work and identify potential licence incompatibilities early on. [14]

Currently, hundreds of licences are recognised as open and are used by public administrations around the world. Such a proliferation of licences may lead to compatibility issues, which could limit the sharing and reuse of IT solutions. When merging two pieces of software code with different licences, for example, the restrictions imposed by a first licence may not be compatible with the restrictions imposed by a second one, making it impossible to use the combined solution.

In order to reduce this risk, it is important that public administrations **detect licence incompatibilities** as early as possible, for example, with the support of specific tools.

Recommended measures for central bodies

- **Select and promote the use of appropriate licences**

To enable the reuse of IT solutions, central bodies should select appropriate licences and licence templates, and promote their use.

- **Provide support on matters related to intellectual property rights and licensing**

By providing practical advice in these areas, central bodies can support public administrations dealing with intellectual property rights and licensing issues related to the sharing and reuse of IT solutions. This may include, for example, helping them to better understand the rights and obligations associated with a given solution and to identify whether a third party holds any rights to it.

5. Procure IT solutions in a transparent and open way

Context

When procuring IT solutions, public administrations are often restricted by compatibility requirements of existing proprietary interfaces, systems and data formats or they simply underestimate the benefits of relying on **open specifications and standards.** This situation often results in poor procurement practices limiting competition, such as:

- referencing non-standard specifications, which only a few vendors know about and can comply with;
- referencing specific sources, trademarks, patents, etc., favouring certain companies or products.

These practices sometimes result in one vendor providing critical systems for many years and subsequently being difficult to move away from. Such vendor lock-in is estimated to cost European public administrations €1.1 billion a year. Aside from increasing costs, it reduces the available vendor base, excludes new and innovative companies from providing alternative solutions and causes the market to stagnate.

The European Commission has developed The Guide: Using standards for ICT procurement to help procurement officials, IT managers, strategists and architects within public organisations, and policy makers at central government level, to use standards and other technical specifications in the procurement of IT. [22]

5.1. Use common standards and specifications in IT procurement

Using standards and open specifications is crucial to avoid vendor lock-in. In the context of IT procurement, public administrations should consider referencing **European and national standards or international IT specifications** identified by the European Commission[9].

Using common standards and open specifications:

- Reduces the technical work needed to link IT systems together;
- Results in cost savings due to lower maintenance and integration costs;
- Increases competition in the EU's Digital Single Market.

The EU Catalogue of ICT standards for procurement, currently under development by the European Commission, aims to encourage public procurers to mention ICT standards and specifications in their calls for proposals. An EU-level catalogue will streamline the use of different specifications, reduce complexity and eliminate redundancies.

5.2. Share assessments of standards and technical specifications

In the context of IT procurement, public administrations should **assess and select the most appropriate standards and specifications**.

Furthermore, **by sharing their assessments of standards and technical specifications** with others, public administrations promote a more efficient use of public funds, reduce duplication of work and improve transparency in the procurement process.

The Common Assessment Method for Standards and Specifications (CAMSS) helps public administrations to assess specifications and identify those that fit to their specific needs. The CAMSS catalogue on Joinup allows administrations to share and reuse these assessments. [24]

[9] The European Commission can identify IT specifications that are not national, European, or international standards, provided they meet precise requirements. Once identified and approved, these specifications can then be referenced in European public procurement [10] and [15].

A good way of sharing assessment findings is to create a common list of standards and specifications along with their assessments so that they can be reused by different public administrations.

5.3. Use standard clauses and contractual templates that facilitate the sharing and reuse of IT solutions

The use of standard clauses and contractual templates is a common practice in public administrations. Emphasis should be given to making 'sharing and reuse' part of these clauses.

This way, vendor lock-in can be avoided. Similarly, the degree of legal certainty and the potential for the procured IT solution to be shared with other administrations will be increased. As such, clauses are usually issued by institutions and organisations that are experts in the field and are drafted in a way that leaves little room for different interpretation. Public administrations should, therefore, **develop standard clauses or reuse already existing ones**.

The 'Standard Sharing and Reusing Clauses for Contracts' is a document that includes standard clauses for contracts, which public administrations can use for clauses that refer to developing reusable solutions and to reusing already existing ones. [26]

5.4. Open source software: take into account community contribution in public procurement

The **involvement of communities in the development and maintenance of IT solutions** fosters competition between service providers, especially when large communities can contribute instead of one single company.

One of the main strengths of open source software is that the development process, at its best, involves a community of several firms, individuals and other contributors. Contribution is not limited to writing code; it extends to, for instance, providing detailed reports of requirements and issues as well as examples and tutorials.

Public administrations can also provide indirect support to the open source community by asking tenderers that have selected open source software to demonstrate their level of contribution to the relevant developer community[10].

The Guideline on Public Procurement of Open Source Software explains how public administrations can acquire open source solutions and why they should. [19]

GitHub is an online community of 15 million people and a web-based Git repository hosting service. It hosts more than 38 million projects.

Recommended measures for central bodies

- **Support the use of common standards and specifications**

Central bodies should encourage the use of common standards and technical specifications in public procurement, for example, by creating a common list of such specifications.

[10] This criterion must be applied carefully, as there are cases where only a limited number of companies contribute actively to the development of a particular software application. The need to support that community by supporting the active contributors must be balanced with the need to foster competition and encourage a diversity of contributors.

6. Document, share and reuse common solution building blocks

Context

To provide better services to citizens, businesses and other administrations, public administrations are continuously increasing the scope and volume of information exchange with each other, across both borders and sectors. To facilitate these exchanges, the need for **common solution building blocks** in Europe is more pressing than ever.

Using common terminology to design, assess and find common IT solution building blocks increases interoperability and decreases the development cost of often very complex IT systems.

6.1. Document key solution building blocks using a common reference architecture

The European Interoperability Reference Architecture (EIRA) defines the most important architecture building blocks needed to develop, assess and communicate about interoperable solutions for digital public services. [13]

To carry out day-to-day operations, public administrations require complex and large-scale IT solutions. However, these solutions are often developed in their specific contexts and their functionalities are neither documented nor categorised in a common way. Due to this lack of clarity about the available IT components, it is difficult to organise effective IT governance. Frequently, this results in redundant expenditure and competing solutions giving rise to a costly and fragmented IT landscape.

To address this issue, public administrations should map key solution **building blocks to a common reference architecture**, in accordance with a common vocabulary, terminology and structure. This way, it is known which building blocks serve which user needs and also if there are needs not supported by any building block.

6.2. Check the reusability of existing solutions before developing a new one

The European Commission has included the notion of the 'digital check' in a Toolbox (tool No. 23 on 'ICT assessment, the digital economy and society') that supports the Impact Assessment process of new or revised EU legislation. [21]

Before commissioning or developing new IT solutions, public administrations should check whether similar solutions already exist and can be reused. Such a '**digital check**' should also be performed at the highest possible level, i.e. as part of an IT impact assessment for new legislation. In this way, public administrations will ensure that the reuse of common IT solutions is taken into account early in the policymaking lifecycle.

Carrying out such a reusability check should be a prerequisite for any organisation asking for funding. This would provide clear evidence that the solution to be developed does not exist yet or that it can benefit from existing solutions or building blocks, ensuring that public resources are used efficiently.

Administrations should carry out reusability checks by consulting **common registries of reusable IT solutions**.

Recommended measures for central bodies

- **Manage solutions like portfolios using a common reference architecture**

Central bodies should create a common reference framework for a particular sector or field of interest by creating a portfolio of solutions using a common reference architecture. This makes it easier for public administrations to understand what solutions exist and to reuse them.

The Connecting Europe Facility (CEF) provides building blocks that offer basic capabilities to be used in any European project to facilitate the delivery of digital public services across borders. [17]

- **Offer generic and reusable building blocks**

Central bodies should offer generic, interoperable and reusable **building blocks** that are less bound to specific requirements and have a greater potential to be reused.

- **Encourage the reuse of IT solutions by using an Application Programming Interface (API)**

To encourage reuse, functionalities could be offered as services and/or accessed via an API. This would decrease the effort required to share and reuse solutions and would help to avoid the costs associated with adapting a solution to meet a public body's needs.

- **Provide testing environments and organise plugtests**

In general, test environments are useful for public administrations that are considering reusing a solution because they let them check whether the solution and existing systems are interoperable. Central bodies are in a good position to consider providing testing environments and organising plugtests[11], thereby creating an optimal setting for innovation in the area of public sector IT solutions.

[11] Plugtests are events based on a standard, which allow developers to improve standard compliance and interoperability. They raise awareness about the standards around which the event is organised.

7. Enhance your IT solution's technical readiness

Context

An IT solution's technical characteristics are important when assessing its reusability. Its internal architecture and the technologies it uses also have a huge impact here. For instance, it is often very costly or even impossible to take a system built for a specific purpose and adjust it to satisfy slightly different business needs. Similarly, systems designed based on old and inflexible technologies may be difficult to scale up to support increased usage.

7.1. Design your IT solution to be extensible and modular

To ensure the technical readiness of IT solutions, public administrations should develop them to be extensible, i.e. to be able to evolve beyond their current functionalities with minimal or no effect on their internal structure. It is also important for them to be modular, which means designed in a way that similar functionalities are bundled in independent modules. In this way, possible changes to one module do not produce serious impact on the other modules. Software systems have long lifespans and may be modified several times to add new features and functionalities demanded by users. Extensibility and modularity make it possible for developers to adapt the software's capabilities and facilitate reuse.

7.2. Design your IT solution to be scalable

The **scalability** of an IT solution qualifies its adaptability to an increased need for technical capacity, such as the processing power, storage and network bandwidth to accommodate bigger numbers of users, transactions, etc., without diminishing its level of quality. Scalable IT solutions are more appealing candidates for reuse due to their ability to expand to meet user needs.

7.3. Plan adequate levels of maintenance and support for your IT solution

The availability of **maintenance and support** for a particular IT solution determines its technical readiness and trust in using it and, consequently, increases its reuse potential.

Public administrations should plan for a proper organisation of maintenance and support services (i.e. defined in Service Level Agreements) to encourage the reuse of IT solutions. If this support is offered by a third party, the accreditation level of the latter by the original developer should be taken into account to limit the risks associated with reuse.

7.4. Assess an IT solution's maturity level

The **level of maturity** of an IT solution is a key aspect that public administrations should assess in order to determine the extent to which it is reusable. Mature IT solutions meet certain requirements in terms of:

- documentation, i.e. documented processes and governance, source code availability, technical documentation, installation manuals, user documentation, bug reports and fixes, contribution guidelines;
- software code quality;
- helpdesk and support;
- licensing [5].

The European Commission has developed the Reusability Guideline and Checklists to help public administrations assess the reusability of IT solutions. [23]

8. Increase visibility of and trust in available IT solutions

Context

For a public administration to reuse another administration's IT solution, it should first know that the solution exists, where it is located, and then trust that it is safe, technically mature and documented enough to be reused.

Public administrations already make their reusable IT solutions available online in a number of national and European registries or catalogues[12]. However, although there are already many such registries available, it is often difficult for public administrations to make a sound decision about which solution to choose because of the poor quality of the description provided.

Another issue is that public administrations do not share information in advance about upcoming shared services, public APIs or solutions under development in general. This results in potential solution vendors not being able to sufficiently prepare for opportunities to develop shared services for public administrations or to build on publicly available APIs. Consequently, public administrations do not obtain timely and adequate responses to their needs.

8.1. Use common registries to share your solutions

To facilitate the identification of and access to IT solutions, it is recommended that public administrations make them available in single access points such as specialised **common registries**, instead of limiting publication on their own websites. A common registry is a system devoted to the proper structuring, publishing and description of IT solutions (including governance schemas, business processes, technical architecture, software code, etc.).

By populating a comprehensive registry of IT solutions open to different organisations, public administrations increase their visibility and the possibility that their published IT solutions will be reused.

Joinup.eu is a European platform that allows public administrations to: access solutions published in a central catalogue; share experiences and good practices; and work together in a collaborative way. [16]

[12] The term 'registry' and 'catalogue' are used interchangeably in this text.

8.2. Use standard ways to describe your IT solutions

If public administrations do not trust an IT solution, they are most unlikely to use it. Raising awareness and communicating about IT solutions, as well as providing examples of their successful reuse, help build trust, credibility and confidence.

Public administrations should describe their solutions in standardised ways [6] when publishing them in common registries, thus facilitating their categorisation in different themes (policy, business, technology) and their overall searchability.

If other registries use similar ways of describing their content, solutions can easily be published in several such registries, increasing their visibility.

8.3. Provide insights into the quality, usage and support structure of your IT solutions

Information about an IT solution's levels of quality and expected support is fundamental to any decision as to whether to reuse it or not. To this end, administrations that share their IT solutions should document the following information as a minimum:

- the governance and business models, including how sustainability is taken into account;
- the aim of the solution and related policies or legislation;
- the solution's target audience, including the size of the organisation(s) using it;
- the targeted sector (for sectoral solutions);
- the solution's functional requirements and use cases;
- a description of the business process;
- the maintenance and support structure;
- test scenarios and results;
- user experience tests;
- planned future releases;
- reuse and deployment cases and metrics.

It is important to note that standardised descriptions on their own are not sufficient; the quality of the data included in a description is paramount.

Recommended measures for central bodies

- **Operate national/regional registries and consolidate them at EU level**

Central bodies should support public administrations that want to publish their IT solutions by providing them with the needed registries. These should preferably be part of a central European registry (see also section 8.1), thereby maximising their reuse potential. Central bodies should make sure that registries use **standard ways of describing and categorising solutions, such as ADMS-AP and EIRA**, and that they support multiple languages.

ADMS-AP is an example of a standard way of describing IT solutions included in registries/catalogues. [6]

- **Provide Guidance on registries**

Common registries should help public administrations assess the extent to which their solutions are reusable and can be included in a registry. Using a standard **checklist** to validate the solutions' compliance levels against the reusability criteria required by the registry would facilitate this.

The European Commission has developed the Reusability Guideline and Checklists to help public administrations assess the reusability of IT solutions. [23]

- **Organise workshops to raise awareness and share know-how**

Central bodies should organise thematic workshops focusing on the sharing and reuse of solutions (e.g. around specific themes, such as e-Identification, geospatial solutions, etc.) in order to raise awareness and develop the necessary expertise across public administrations.

- **Organise exchanges between public administrations**

Public servants should take part in study visits and twinning projects with other public administrations. Collaborating with other bodies would help public administrations to understand common needs and encourage the sharing and reuse of solutions.

- **Share information on APIs and requirements for shared services**

Central bodies should announce upcoming public APIs in order to make solution vendors aware of interfaces through which they could develop solutions. This would facilitate the timely and efficient delivery of solutions that meet public administrations' needs.

Similarly, central bodies should disseminate information about requirements for upcoming shared services to offer solution vendors insights into the future needs of public administrations. This will allow vendors to plan ahead for their possible business opportunities.

9. Take into account the multilingual EU environment when developing IT solutions

Context

One of the underlying principles of the European Interoperability Framework is that public administrations should take multilingualism into account when developing **the internal structure and documentation** of IT solutions in order to improve their potential to be reused across borders.

Despite its importance, the multilingual aspect of IT solutions is frequently overlooked. Public administrations rarely prioritise the need for multilingualism from an end-user perspective, which renders cross-border reuse impossible or too expensive.

As an answer to this concern, internationalisation rules should apply when developing IT solutions to enable their reuse in a multilingual context, and support their technical and financial sustainability.

9.1. Follow basic internationalisation principles

Localisation involves adapting an IT solution in order to meet language, cultural and other types of requirements in a specific market, such as numeric systems, date and time formats, use of currency, etc. IT solutions that cannot be localised with reasonable effort have low potential to be reused across borders. Thus, public administrations should insist that developers follow basic **internationalisation principles** during the design of IT solutions to allow their adaptability to various languages and regions without any engineering changes.

There are several guidelines available on internationalisation principles. An example of such a guideline is W3C's Internationalisation (i18n) Activity. [25]

The effort and detail required to create IT solutions that support several languages should not be underestimated. For example, a key challenge lies in ensuring that the IT solution is flexible enough to handle different ways of displaying and processing information in other countries and cultures. In fact, developers might make ill-informed assumptions about their users' language and customs. For instance, the displayed numerical value of currency differs depending on whether it refers to US or Canadian dollars.

When developing IT solutions, public administrations can overcome barriers to localisation and international deployment by applying internationalisation principles, such as enabling the use of Unicode for textual data and separating elements that can be localised from source code or content.

9.2. Provide documentation in multiple languages

In a multilingual environment, such as the European Union, documentation of IT solutions needs to be available in different languages for reuse to be as widespread as possible.

Public administrations should document their IT solutions in multiple additional languages, or at least in English, to help users understand what the solution is about and how to reuse it.

However, in certain circumstances, the significant volume of content to be translated makes it very difficult to carry out this task exclusively by human translation.

Public administrations can, therefore, also use **machine translation services,** such as the **CEF Automated Translation.**

The European Commission has developed the CEF Automated Translation [18], a machine translation service that can be accessed over a secure internet connection and used by any European public administration.

Recommended measures for central bodies

- **Support internationalisation principles**

Central bodies should support the use of internationalisation principles among public administrations by raising awareness and promoting good practice.

10. Share your solution by default and explain any decision not to share

Context

For sharing and reuse to become the rule, a cultural shift needs to happen in the public sector. Sharing an IT solution should become the default approach. However, there are circumstances where public administrations may be understandably reluctant to participate in the collaborative development of IT solutions.

For instance, a key step in sharing software is exposing its source code. This allows potential users to understand its functionalities or adapt them as required. Exposing the source code to a wider public also makes it easier to identify and fix weak security points.

While restrictions on the sharing and reuse of IT solutions may be justified, public administrations should document these decisions based on a full assessment of the restriction's potential benefits and drawbacks.

10.1. Provide explanations for restricting sharing

Public administrations should share IT solutions by default. Exceptions may occur, for instance due to security, privacy or legal considerations. In these cases, public administrations should always **explain the circumstances and justify the exception**.

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