Interoperability Maturity Model

IMM Full - Recommendations

12 February 2016

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1 Introduction

The main objective of the IMM is to provide insight on how European public services can improve interoperability maturity. After filling in the online questionnaire the respondent will receive a PDF with advice how to improve the interoperability of their respective public service. This report discusses how these recommendations are generated.

1.1 Principles

The following five principles are applied to generate recommendations:

- **Principle 1:** Each interoperability attribute differentiates between at least two maturity levels;
- **Principle 2:** The improvement tables provide recommendations how to improve maturity step-by-step for a specific interoperability attribute;
- **Principle 3:** When a public service does not have the maximum level yet for a specific interoperability attribute, a recommendation is given to make the step towards the next interoperability level;
- **Principle 4:** When a public service does have the maximum level for an interoperability attribute, no recommendation is given;[1]
- **Principle 5:** When the foreseen maturity improvement is a sliding scale (e.g. from less to more), a generic recommendation (not maturity level specific) is given to improve the maturity further along the sliding scale.

1.2 Recommendation overview

For each improvement step, the recommendation tables in the following chapters show:

- The question the recommendation relates to;
- The assessed maturity level;
- The next maturity level to be achieved through improvement[2];
- The general recommendation as to how to achieve the next maturity level.

[1] The reason for this is that in this case- according to the model- the service is already implementing an interoperability attribute in a way that it corresponds to best practice. There are no direct recommendations to improve further.

[2] With the exception when this is a considered a sliding scale.

2 Service Delivery (B)

2.1 Scoring Table

	Ad hoc (1)	Opportunistic (2)	Essential (3)	Sustainable (4)	Seamless (5)
B.1	No Score				
B.2	Single Device/ platform/ browser		Multiple Devices, platforms, browsers		All common available devices, platforms, browsers
B.3	No pre-filling		Partial pre-felling		Full pre-filling or Not Applicable
B.4	Not at all		Partly, only the user interface is multilingual		Fully, the entire service as such is multilingual
B.5	No		Yes, the public service is referencing to other sites offering related public services	Yes, the public service is being referenced from other sites	Yes, the public service is being referenced from other sites and the public service is referencing to other sites offering related public services
B.6	No, even though there is a Service Catalogue in place		No, because there is no Service Catalogue available.		Yes, the service is included in the Service Catalogue

Table 1: Scoring Table 'Service Delivery'

2.2 Recommendations

Question	Assessed level	Next level	Recommendation
B.1 Delivery channels			No specific recommendation
B.2 Device, platform and/or browser dependency	Ad Hoc (1)	Essential (3)	Currently, your public service runs on a single device, platform and/or browser. Expand the range of devices, platforms and browsers to those which meet your (potential) user group's most pressing needs. Refrain from trying to catch up with obsolete solutions or solutions that risk becoming obsolete. In regard to innovative solutions, consider integrating them in your service delivery strategy once they have attained a certain maturity and have proven their potential.
	Essential (3)	Seamless (5)	Currently, your public service runs on several but not all devices, platforms and/or browsers. Ensure full device-independence of your service. Periodically follow technology developments to make sure device-independence is maintained in the long-run. Ensure that the service's quality and the user experience are equally high across devices, platforms and browsers.
B.3 Form pre-filling	Ad Hoc (1)	Essential (3)	Currently, your service does not require pre-filling or does not make use of pre-filling. If the former is the case, periodically evaluate whether pre-filling has not become essential as your service evolves. For both cases, consult peer practices in order to make sure that you don't miss out on opportunities to pre-fill. Evaluate and map the different sources that you could use for pre-filling. Run user testing if appropriate to define which fields could be pre-filled and what impact the pre-filling has.
	Essential (3)	Seamless (5)	Your service pre-fills selected, but not all data fields which would be electronically available. Pre-filling is one of the strongest manifestations of interoperability as it adds significant value to users in terms of reducing burden and speeding up the service request process. Within your administration, pre-filling minimises the risk of erroneous data entries. Map all information that would be electronically available and design your service to consume it electronically. Start with authentic sources first, but also consider using sources of information which do not have this legal status, but possibly offer similar added value.

B.4 Multilingualism	Ad Hoc (1)	Essential (3)	Your service is not multilingual. Consider at a minimum offering a multi-lingual interface. Offer it in one or several languages which best reflect the composition of your user community. You may start with offering multilingual basic information first, and then expand the scope of the translation.
	Essential (3)	Seamless (5)	Currently, your user interface is multilingual. Whilst this is a good starting point, you may consider providing the entire service (including functional and technical documentation) in multiple languages. Make use of automated translation tools to achieve this goal. Consider collaborating with pan-European peers to spread burden, streamline functionalities and make multilingualism an integral part of your service delivery strategy.
B.5 Cross-referencing	Ad hoc (1)	Sustainable (3)	Currently, you do not cross-reference your service with other services. Consider establishing cross-references at a minimum one way, i.e. either from other public services to yours, or vice versa. Interlinks will increase the find-ability of your service, thereby attracting additional users and will provide a more seamless user experience.
	Essential (3), Sustainable (4)	Seamless (5)	Currently, your service cross-references with other public services one way, i.e. either from other public services to yours, or vice versa. Ensure your service is fully integrated into other administrations' web presence and that you in turn integrate others' public services. Make sure you do not view your service in isolation but rather as a part of a life event or package which seamlessly serves its users when a specific situation occurs. Typically, such situations vary from one case to the other, hence the need to cross-reference from/to multiple related sites.
B.6 Service Catalogue	Ad Hoc (1)	Seamless (5)	Currently, your public service is not registered in a Service Catalogue while this is possible. Registering your public service within an accessible catalogue is recommended to promote and increase the usage of the service.
	Essential (3)	Seamless (5)	Currently, there is no Service Catalogue available for registering public services. You are encouraged to work together with other public administrations to start an initiative on this area.

Table 2: Recommendations 'Service Delivery'

3 Service Consumption (C)

3.1 Scoring Table

The Full IMM provided deeper insight by assessing each digitally consumed service consumed on a case by case basis.

Question	Ad hoc	Opportunistic	Essential	Sustainable	Seamless
C.1-C.2 -C.3	Produce (develop) the service or protocol, while reuse is possible. Manual consumption	Digital reuse: Scoring outcome dependent on C.4-C.11			
C.4		Batch processing while real-time could be an option	Batch processing only due to legal, technical or other constraints	Both processing modes	Real-time processing
C.5		Pull only, whilst push could be added	Pull only, due to legal, or other constraints	Push only whilst pull could be added	Push only due to legal or other constraints --- Both mechanisms are used
C.6					Common protocol specification

C.7		Dedicated private network whilst existing network could be reused	The service is consumed via a new dedicated private network due to security or other specific concerns	The service is consumed via an existing private network (e.g. sTesta)	The service is consumed using the publicly available Internet
C.8		All data models were created for the service without using any existing semantic standards	Some proprietary semantic standards are used		The whole development of the data model is based on open non-proprietary standards and specifications
C.9		Fully manually	Semi-automated		Fully automated
C.10		No, while a certification procedure is available	No, there is no certification procedure available		Yes, certification
C.11		No, although this would have been possible	No, this was not possible		Yes

Table 3: Scoring Table 'Service Consumption'

3.2 Recommendations

The Full IMM provides deeper insight by assessing each digitally consumed service on a case by case basis.

Considering the additional insight provided enhanced recommendations not listed here are to be made that directly consider the consumed services identified and industry best practice.

Question	Assessed level	Next level	Recommendation
C.2 Manual / digitally	Ad hoc (1)	n.a.	Your are currently consuming the service manually. You could enhance your interoperability by 'digitalizing' the process. This will create possible benefits on the area of data quality, throughput time, costs and interoperability.
C.3 Realise (produce versus reuse	Ad hoc (1)	n.a.	You are currently not reusing the service from other public administrations whilst it would be available. This shows that you are not making use of existing services to increase the effectiveness and efficiency of your own service. Elaborate why this is the case. Before building your own services, always take the time to map existing ones to possibly adapt

			them for your own purposes. Understand how you can improve your view on which services are being provided by other organisations.
C.4 Processing mode	Opportunistic (2), Essential (3), Sustainable (4)	Seamless (5)	You are currently supporting batch processing of transactions whilst full real-time processing would deliver significant benefits to the public service. Collaborate with the service owner of the consumed services and try to leverage direct processing of transactions based on a business case approach and the end user in mind.
C.5 Push-pull mechanisms	Opportunistic (2),	Seamless (5)	Your service is currently interacting with other services via a pull mechanism whilst the push mechanism could be added. Review the frequency with which the information is being pulled. Assess the extent to which this frequency is sufficient or whether you risk losing out on key events between two updates. Verify whether the service's provider would be capable of sending automatic and real time updates and request them accordingly. Map your constituent landscape and assess who relies on push or pull mechanisms respectively. Ensure you can consume both.
	Essential (3)	Seamless (5)	Your service is currently interacting with other services via a pull mechanism. Review the frequency with which the information is being pulled. Assess the extent to which this frequency is sufficient or whether you risk losing out on key events between two updates. Verify whether the service's provider would be capable of sending automatic and real time updates and request them accordingly. Map your constituent landscape and assess who relies on push or pull mechanisms respectively. Ensure you can consume both as effectively your legal or technological restraints allow.
	Sustainable (4)	Seamless (5)	Your service is currently interacting with other services via a push mechanism whilst the pull mechanism could be added. Review if adding a pull mechanisms would increase the capability of the public service to consume more services. Map your constituent landscape and assess who relies on push or pull mechanisms respectively. Ensure you can consume both.
C.6 Common protocol usage	Ad Hoc (1)	Seamless (5)	Currently, you are using a proprietary protocol specification for exchanging structured information. Using this dedicated protocol hinders dialog beyond your organisation's boundaries. Encourage the use of common protocol specifications both in your organisation and beyond. Verify in how far existing, widely used protocols could be adopted in your current services. For future implementation, favour common protocols over proprietary and ad hoc solutions. Rigorously judge upon exceptions to this rule.

C.7 Reuse of network infrastructure	Opportunistic (2), Essential (3)	Seamless (5)	Currently, you are using a dedicated, private network to exchange information rather than the Internet. Systematically assess which risks are driving this decision and what alternatives can be leveraged such as an existing dedicated private network or the Internet.
	Sustainable (4)	Seamless (5)	Currently, you are using a dedicated network to exchange information rather than the Internet. Systematically assess which risks are driving this decision and if the Internet would be a viable solution.
C.8 Semantic alignment	Opportunistic (2)	Essential (3)	At this stage, you are exchanging information based on ad hoc, proprietary semantics. Consider utilising elements of a common semantic standard. Benefits include: no need to convert the semantics; reduced risk that information is lost or distorted and improved analytical capabilities. Define a road map to achieve better semantic alignment with other, external organisations.
	Essential (3)	Seamless (5)	At this stage, you are still using proprietary elements in exchanging information instead of fully utilising a semantic standard. Consider the benefits of moving towards a fully common semantic standard. The benefits are multiple: no need to convert the semantics; reduced risk that information is lost or distorted. Define a road map to achieve better semantic alignment with other, external organisations.
C.9 Exception handling	Opportunistic (2)	Essential (3)	Currently, exceptions occurring in the course of the consumption of the service are solely handled manually. This is likely not to be the most cost- and time efficient way of handling exceptions. Identify those incidents which have a common pattern and occur frequently. From these, select those for automation which are the most straightforward to detect and solve electronically,
	Essential (3)	Seamless (5)	At this moment, a part of the exceptions occurring during the consumption of the service is handled electronically. Assess which additional exceptions offer potential for automation. Make sure you classify exceptions according to accurate criteria such as frequency, commonalities, cost of managing the exception and potential for automated exception handling. Ensure that automated procedures are rolled out to as many additional types of exceptions as possible.
C.10 Certification	Opportunistic (2)	Seamless (5)	You are currently consuming some or all of the services without going through certification whilst a certification procedure would be available. As a result, you create the risk of interconnections not working properly e.g. in terms of security, governance, technological and semantic interoperability and availability.

			Consider following the certification procedure in place, for the time being and also for future upgrades.
	Essential (3)	Seamless (5)	You are currently consuming the service without certification as no certification procedure has been put into place by the providing organisation. This creates the risk of interconnections not working properly. Multiple aspects such as security, governance, technological and semantic interoperability and availability risk being overlooked. Clarify the need for proper certification with the service provider. Encourage certification, both of your services with other services and vice versa. Reflect on peers' certification policy and best practices.
C.11 Specification process	Opportunistic (2)	Seamless (5)	Currently, you are not participating in the specification process whilst the opportunity is there. Your participation would in fact result in a range of benefits: upfront alignment in terms of interoperability with other services; learning and good practice sharing with other organisations; identification of additional opportunities to further foster interoperability; and most importantly a clear opportunity for your organisation to influence the other service's design. Consider joining the specification process at the earliest opportunity.
	Essential (3)	Seamless (5)	You are currently not participating in the service's specification process since this is not possible. Proactively push for participation and make sure the providing organisation remains aware of your service's needs and requirements.

Table 4 Recommendations 'Service Consumption'

4 Service Management (D)

4.1 Scoring Table

	Ad hoc (1)	Opportunistic (2)	Essential (3)	Sustainable (4)	Seamless (5)
D.1	No, cost and benefits of the public service are not identified		Yes, cost and benefits of the public service were detailed based on a common business case approach (e.g. cost-benefit analysis, total cost of ownership calculation)		Yes, cost and benefits of the public service were detailed based on a common business case approach. In addition multiple scenarios were compared
D.2	The public service makes no services available towards the external environment, while this would be possible		The public service makes no services available towards the external environment due to constraints	The public service makes some services available towards the external environment	The public service makes available all services towards the external environment
D.3	No		Yes, however not enforced sufficiently		Yes, and enforced to ensure compliance
D.4	No		No, this is decentralized or not considered relevant		Yes
D.5	Fully manual (all transactions are handled manually) choreography		Semi-automated (a part of the service choreography relies on manual interference) choreography		Fully automated (no manual interference is required) choreography
D.6	No status information shared		Yes, in some cases		Yes, systematically with all services
D.7	No, never	No, even though processes are modelled	Yes, in some cases		Yes, systematically with all services
D.8	Business processes are not modelled at all		Business processes are modelled and executed on a proprietary basis		Business processes are modelled and executed using BPM standards
D.9	No, although relevant frameworks are available		No, there are no relevant frameworks available to consider	Yes, one or multiple architecture frameworks are used	Yes, one or multiple architecture frameworks are used - independent audits
D.10	No, the architecture cannot be considered flexible		The architecture allows for some flexibility		Yes, the architecture is highly flexible
D.11	No, the specification process is closed			Yes, participation upon invitation	Yes, open participation

Table 5: Scoring Table 'Service Management'

4.2 Recommendations

Question	Assessed level	Next level	Recommendation
D.1 Cost-Benefit Analysis	Ad hoc (1)	Essential (3)	At this moment your public service has not conducted a cost-benefit analysis. This would be of added value to better understand the cost and benefit drivers in the context of interoperability improvement.
	Essential (3)	Seamless (5)	Currently, cost and benefits are detailed based on a common business case approach. However, your public service could further improve the decision-making process by analysing multiple alternative scenarios and their impact on the interoperability of the public service and related cost and benefits.
D.2 Service Provision	Ad hoc (1), Essential (3)	Sustainable (4)	At this moment your public services delivers no or some services towards the external environment. Use an overarching business case approach to determine if it would add value to the landscape to create new services to further optimise functionality and data quality & insights within your and other administrations.
	Sustainable (4)	Seamless (5)	At this moment your public service does not provision all services towards the external environment due to certain constraints. Since the public landscape is changing, these constraints can change over time. Review every 6 months how the public service can improve this potential and deliver functionality and/or data towards other administrations and businesses. Consider the increasing requirement for machine to machine service provision and how this will impact your service delivery.
D.3 Procurement criteria	Ad hoc (1)	Essential (3)	At this moment your public service does not use a set of defined procurement criteria to steer on reuse and interoperability. Institutionalising a set of criteria or principles would benefit the service and administration because common pitfalls (e.g. proprietary development while services are available for reuse) can be prevented.
	Essential (3)	Seamless (5)	Although there is a set of defined procurement criteria it lacks enforcement by either the procurement department, sourcing department or architectural function. Strict enforcement will ensure that procurement criteria are an effective steering mechanism to foster greater interoperability.
D.4 Central point of control	Ad hoc (1), Essential (3)	Seamless (5)	Currently, your public service does not have a central point of control. This means that there is no unified, unique source in place that can reliably track all individual cases handled. Make

			sure that information currently handled in separate bundles is combined in a meaningful and efficient way so irregularities are spotted immediately and resolved efficiently. Increase intelligence by aggregating information and centralising control over cases handled in your system.
D.5 Level of automation of the choreography	Ad Hoc (1)	Essential (3)	Currently, service choreography is handled manually only. This manual interference locks up human resources and is time-consuming. Crucially, the error rate of manual intervention is typically higher than automated resolution. As a first step, eliminate manual intervention for standard cases that occur frequently.
	Essential (3)	Seamless (5)	Service choreography is currently semi-automated. Automate choreography in full to further increase speed and seamlessness of interaction between your public service and the services you consume and provide. Consider the benefits of automation of choreography as an investment which will enable you to handle a wider range of incoming and outgoing workflows and participants in future.
D.6 Status information	Ad Hoc (1)	Essential (3)	You are currently not sharing status information with the services you are orchestrating. This leaves other, partner or dependent service owners without any information and insight on the cases handled (similar to a “black box”). Procedures to obtain status information from your service may be burdensome and time-consuming, discouraging such requests. Consider with which services the sharing of status information would be the most beneficial, using criteria such as the frequency and type of interaction.
	Essential (3)	Seamless (5)	You share status information with some of the services you are orchestrating, but not all. Map the latter and identify with which additional services it would be beneficial to share status information. Make sure all service owners are informed systematically and in a timely manner thereby increasing not only interoperability, but also proactiveness and transparency of service flows.
D.7 Business process definitions and rules	Ad Hoc (1) Opportunistic (2)	Essential (3)	At this stage, you do not have coherent business process definitions and rules in place. This means that in day-to-day operations, your collaboration with other services is governed ad hoc, burdening your own and other services’ organisation. Consider putting in place a more manageable, consistent framework for establishing business processes, in particular where interdependencies between organisations are considerable.
	Essential (3)	Seamless (5)	Business processes and rules are increasingly streamlined but not yet systematic. Identify which workflows and communication lines require

			further alignment such as procedures to identify responsibility and liability, monitor usage or resolve any technical issues which may arise.
D.8 Business Process Management standards	Ad Hoc (1), Essential (3)	Seamless (5)	Modelling business processes ad hoc is likely to burden your organisation and decreases transparency with collaboration partners. Start modelling business processes more coherently, applying commonly used/accepted standards where possible.
D.9 Architectural Framework	Ad hoc (1)	Sustainable (4)	You have recognised that there are relevant frameworks to use. Consider leveraging these frameworks and integrate their principles in the target state architecture to ensure compliance.
	Essential (3)	Sustainable (4)	Although there may be no relevant framework available to use as a reference stay aligned with best practices to ensure your architecture is future-proof and can be integrated with the external environment.
	Sustainable (4)	Seamless (5)	Although you use one or more relevant frameworks, there is no process of independent audits to ensure compliance towards these frameworks. Consider setting up a yearly process for conducting these audits by an independent authority.
D.10 Architectural flexibility	Ad Hoc (1)	Essential (3)	As your architecture is currently inflexible, your service's functionalities (such as display, business logic, data storage and manipulation) cannot be modified independently but require a substantial overhaul of the underlying IT system. In future upgrades to your service, look for opportunities to decouple functionalities from each other and from operating systems and other technologies that underlie them.
	Essential (3)	Seamless (5)	Your current architecture can be considered semi-flexible. Consider implementing best practices in architectural flexibility such as Service-Oriented-Architecture (SOA) and web-service based solutions to optimise your architecture further.
D.11 Specification process	Ad Hoc (1)	Sustainable (4)	Currently, your public service does not provide the opportunity to other external organisations to participate in the specifications process. Opening up the specification process could have a series of benefits: upfront alignment in terms of interoperability with other services; learning and good practice sharing with other organisations; identification of additional opportunities to further foster interoperability. Consider opening up the specification process.
	Sustainable (4)	Seamless (5)	The specification process of your public service is "upon invitation only". This is selective and you risk excluding organisations which could well be willing to participate. You should consider opening up the specifications process to a wider public. To do so, carefully assess the benefits of doing so (creating an environment of continuous

			knowledge sharing; ensuring the widest possible interoperability) against any possible disadvantages (such as increasing the specification process' complexity). Think of innovative collaborative tools (Web 2.0) to at least partly web-enable the specification process.

Table 6 Recommendations 'Service Management'