ICT Impact Assessment Guidelines

Practical tools and guidelines for assessing ICT implications

DIGIT
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Disclaimer

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Introduction

Under the Better Regulation agenda[1], the Commission runs Impact Assessments (IA) to assess whether future legislative or non-legislative EU actions are justified and how to best design such actions to achieve desired policy objectives. The Commission's IA system follows an integrated approach that assesses the environmental, social and economic impacts of a range of policy options.

When considering policy options, it is important to take advantage of all the opportunities that digital technologies can offer thus fostering innovation and productivity. For this reason, the Better Regulation Guidelines foresee a digital screening mechanism on every Commission initiative to identify at an early stage the policy options that require the use of digital technologies and to ensure that the final Commission proposal applies both on the digital and physical worlds[2].

The importance of the digital screening is also anchored in the European Interoperability Framework[3] (EIF), which stipulates under recommendation 27 that digital checks' are necessary for ensuring legal interoperability. Furthermore, all EU Member States and EFTA countries signed the 'Ministerial Declaration on eGovernment[4]' in Tallinn which marked a new political commitment at EU level on 'mainstreaming digital solutions and technologies in EU policy, to fully integrate digital considerations into existing and future policy and regulatory initiatives'.

In order to address the needs for digital screening and possible further ICT Impact Assessment, the design of the current ICT Impact Assessment Guidelines is coherent with the revised Better Regulation Guidelines[5] and Toolbox[6] of the European Commission. In particular, these guidelines complement what is proposed by Tool #27 'The Digital Economy and Society & ICT issues' of the toolbox. The Directorate-General for Informatics (DIGIT), is maintaining these guidelines, under the programme on Interoperability solutions for public administrations, business and citizens[7] (ISA^2 programme). Annex I of this document describes in detail the governance of the ICT Impact Assessment Guidelines.

What are the ICT Impact Assessment Guidelines about?

The guidelines provide practical tools and templates for assessing, both in qualitative and quantitative terms, the ICT impacts of new Commission initiatives undergoing an IA. ICT impacts are the consequences a specific Commission initiative can have in relation to the use of ICT for the implementation of EU policies. This may entail the development of new ICT solutions or the adaptation of existing ones.

[1] COM(2015) 215: Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Better Regulation for Better Results - An EU Agenda.
[2] Better Regulation Toolbox, complementing, Commission Staff Working Document, Better Regulation Guidelines SWD(2017) 350, Brussels, 7.6.2017. Tool #27. The digital economy and society and ICT issues.
[3] The new European Interoperability Framework (EIF), as part of the Communication (COM(2017) 134) from the European Commission adopted on 23 March 2017, provides specific guidance on how to set up interoperable digital public services.
[4] Tallinn Declaration on eGovernment, Ministerial meeting during Estonian Presidency of the Council of the EU on 6 October 2017.
[5] Commission Staff Working Document, Better Regulation Guidelines SWD(2017) 350, Brussels, 7.6.2017.
6 Better Regulation Toolbox, complementing, Commission Staff Working Document, Better Regulation Guidelines SWD(2017) 350, Brussels, 7.6.2017.
[7] Decision (EU) 2015/2240, https://ec.europa.eu/isa2/home_en

What are the benefits of conducting an ICT Impact Assessment?

Assessing ICT impacts at an early stage (i.e.: when preparing an IA) increases the chances for an efficient, effective and timely implementation of a proposed EU initiative. The early identification and analysis of business and ICT requirements of new initiatives will increase the likelihood that:

- appropriate ICT solutions can be prepared and existing solutions and building-blocks can be reused;
- stakeholders, including the IT Governance of the Commission, are properly involved;
- resources and implementation schedule are better planned.

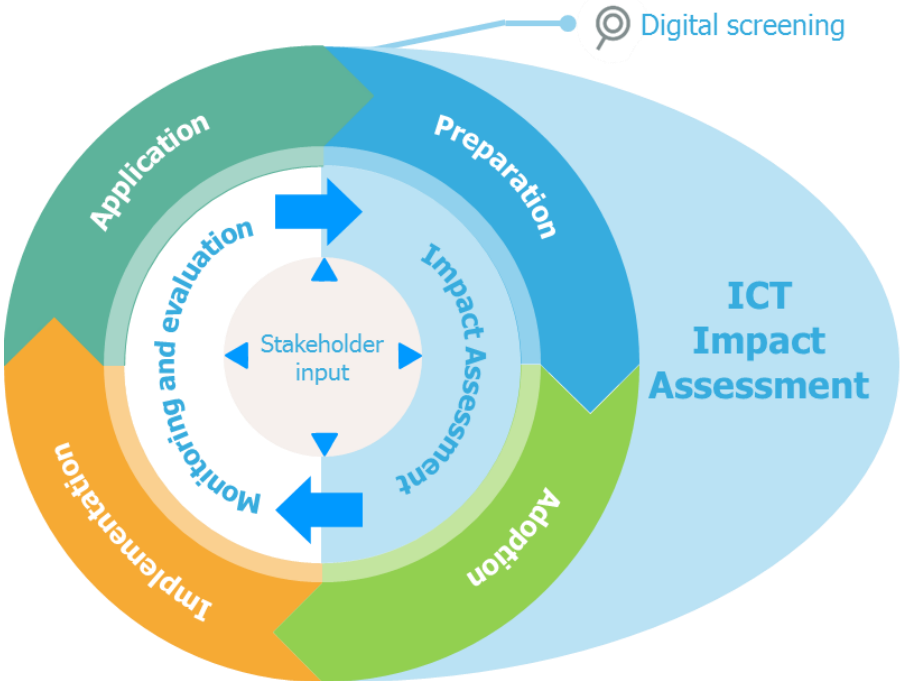
Who is involved in the ICT Impact Assessment?

These guidelines should be used by policy and IT officers from European Commission, including European agencies, to perform their assessments independently or with the support of DIGIT.

When should we conduct an ICT Impact Assessment?

While the digital screening of new Commission initiatives occurs on a monthly basis, an ICT Impact Assessment appears during the preparation and adoption of new Commission initiatives only if the digital screening identifies potential ICT impacts. The guidelines are therefore supplementary to the Commission's overarching IA process, as presented in Figure 1.

Figure 1 ICT Impact Assessment and the EU policy cycle



Source: Adaptation, EU Policy cycle, Better Regulation Guidelines 2017.

How long it will take to complete an ICT Impact Assessment?

The ICT Impact Assessment should, ideally, synchronise with the timeline of the IA, allowing the IA report to incorporate the identified and assessed ICT impacts. On average, an ICT Impact Assessment takes between three and nine months to complete– depending on data availability and the complexity of the initiative.

Support

For any further questions regarding these guidelines, support for assessing ICT impacts and ad-hoc guidance and trainings, please contact DIGIT via the DIGIT-ISA-ICT-IMPACTASSESSMENT@ec.europa.eu functional mailbox.

Alignment with the Commission's Impact Assessment process

The ICT Impact Assessment Guidelines provide a systematic way of assessing the digital aspect of Commission initiatives when preparing an IA. The overall process and main contributions of the ICT Impact Assessment are aligned with the IA process as presented in Figure 2.

1. The digital screening is a monthly monitoring activity run by DIGIT. It aims at assessing the ICT aspects of each new Commission initiative based on the Inception IA prepared by the lead DG (see chapter 2). Whenever a Commission initiative entails ICT impacts, DIGIT informs the lead DG about the identified ICT impacts and recommends that the lead DG performs an ICT Impact Assessment as part of the initiative's IA. In order to facilitate the decision whether or not an ICT Impact Assessment is needed, DIGIT recommends the lead DG to use of the 'Pre-Assessment checklist', which is available in Annex II of this report. DIGIT also informs the IT Governance of the Commission to consider as early as possible all critical upcoming ICT initiatives and to foresee the required resources.

2. Ideally, the scope and objectives of the ICT Impact Assessment in terms of the identification of stakeholders, envisaged data collection methods and tools are included in the IA stakeholder consultation strategy, which latter is amended in case any feedback is received from the consulted stakeholders. The structuring or inception of the ICT Impact Assessment should be summarised based on the ICT Inception report template provided by DIGIT (refer to Annex II). The inception report serves as a starting point for defining the scope and preparing an ICT Impact Assessment.

3. The results of the data collection activities performed in the context of the ICT Impact Assessment should be included in the IA synopsis report. This may cover data collected via the targeted and open consultations, ad hoc contributions directly linked to the preparation of the policy and information received through the feedback mechanism.

4 The results of the ICT Impact Assessment should be summarised based on the ICT Final report template provided by DIGIT (refer to Annex II) and should be incorporated in the Draft IA report as an annex or part of its main chapters. Based on the key findings from the assessment, the final report should provide policy-makers with clear evidence-based results to support decision-making on the preferred policy option (and related technical scenario).

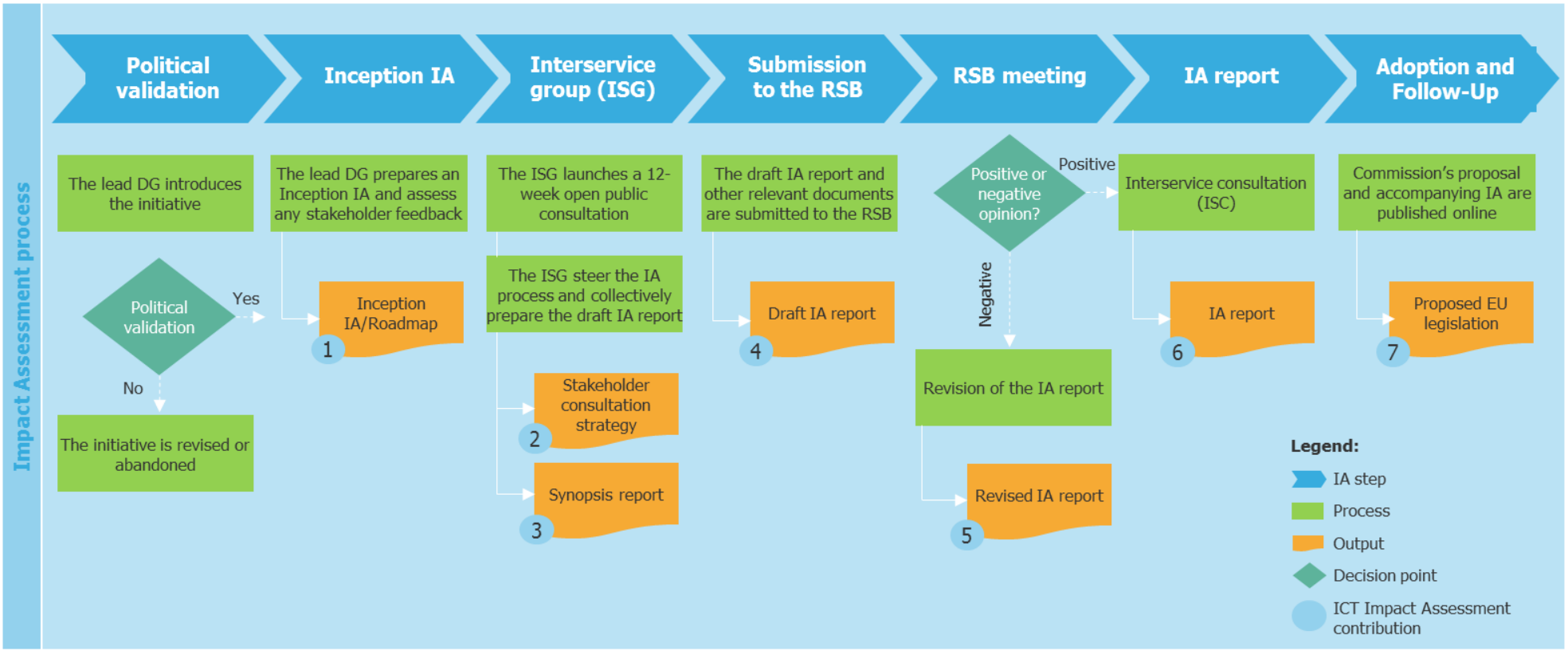
5 In case the Regulatory Scrutiny Board (RSB) provides comments on the ICT elements of the draft IA, the ICT Final report and the IA report shall incorporate the proposed changes accordingly.

6 During the Inter-service consultation (ISC), in case the Commission DGs provide comments on the ICT elements of the Draft/Revised IA report, the ICT Final report and the IA report shall incorporate the proposed changes accordingly.

7 In case the co-legislators[8] provide comments to the Commission on the legislative proposal, the ICT Final report and the IA report shall incorporate the proposed changes accordingly.

[8] Mainly the European Parliament and the Council groups

Figure 2 ICT Impact Assessment and IA process



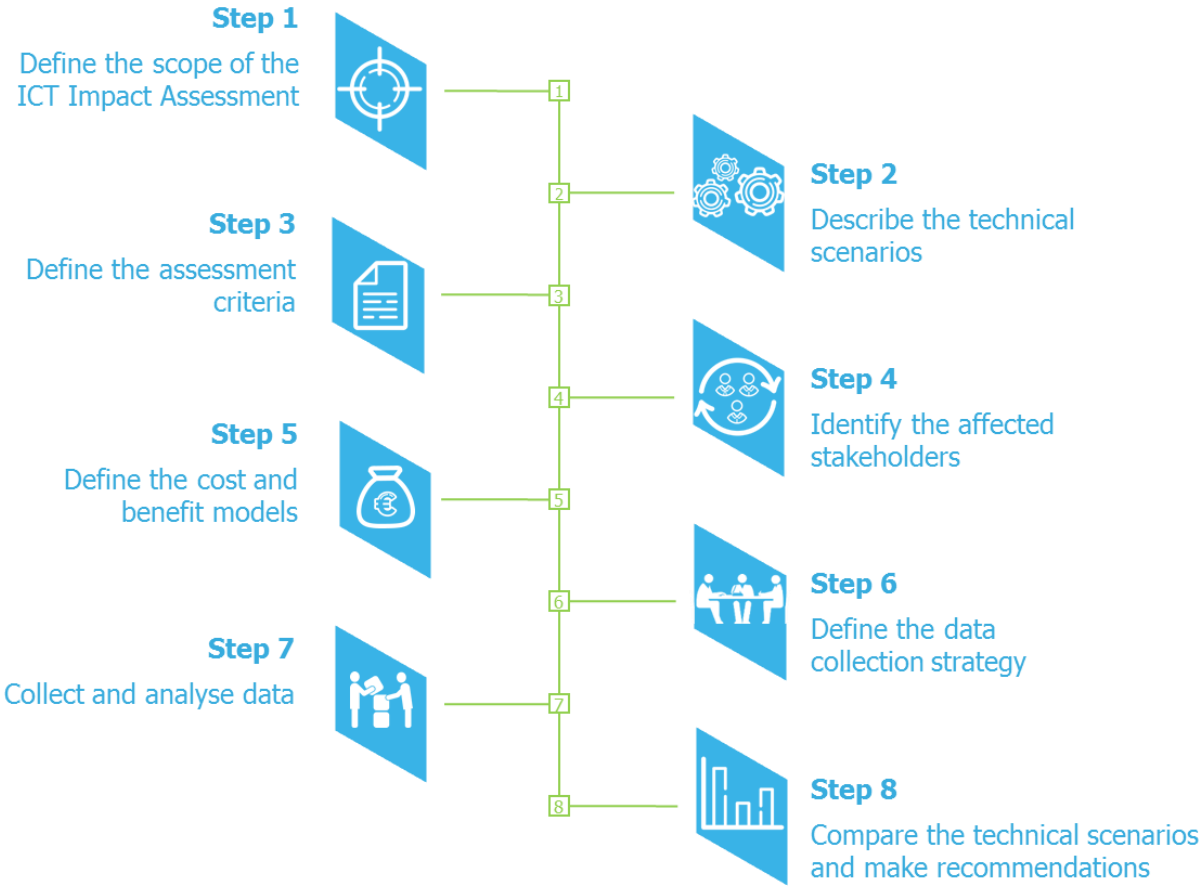
Source: Adaptation, Impact Assessment process, Better Regulation Guidelines 2017.

ICT Impact Assessment Guidelines

As mentioned in the previous chapter, the continuous process of digital screening is dedicated to identify those Commission initiatives which have potential ICT implications and consequently may qualify for an in-depth ICT Impact Assessment. These guidelines provide support to policy and IT officers from the European Commission, when preparing an ICT Impact Assessment related to a Commission initiative. In this respect, the guidelines help to identify the viable technical scenario(s) (also called digital options) associated with the policy option(s) on which the main results of the ICT Impact Assessment are grounded on.

As shown in Figure 3, the ICT Impact Assessment is composed of eight consecutive steps detailed in the remainder of this chapter.

Figure 3 Steps of the ICT Impact Assessment



Step 1 Define the scope of the ICT Impact Assessment

The first step of an ICT Impact Assessment is to define its scope. Like any other IA, the ICT Impact Assessment sets out the logical reasoning that links the problem (including subsidiarity issues), its underlying drivers, the objectives and a range of policy options to tackle the problem. Therefore, in order to define the scope of an ICT Impact Assessment, the lead Commission DG, supported by policy and IT officers collaborating to the initiative, should use the 'scope checklist' presented below. This checklist includes four questions, which do not require conducting an in-depth study but the answers to them provide the necessary information to define the scope of the ICT Impact Assessment.

1. **How much of the problem that the EU initiative should address is due to ICT?**

ICT may create, exacerbate or complicate a problem (e.g. technical issues related to the implementation of the European Citizens Initiative[9]).

2. **How much of the problem that the EU initiative should address may be solved by the use of ICT?**

ICT may also be useful in developing and implementing solutions to address the problem (e.g. Member States found difficulties in exchanging criminal records on convicted persons in an efficient and automated way, therefore the European Criminal Record Information System was created[10]).

3. **How could the use of ICT contribute, directly or indirectly, to achieving the policy objective(s)?**

On the one hand, ICT may produce benefits directly related to the policy objectives. For instance, setting up a new surveillance system gathering seismic information from distributed sensors can help predict better the occurrence of earthquakes; this can contribute to the saving of lives and public money.

On the other hand, ICT may also produce indirect benefits related to the policy objectives. For instance, by putting in place ICT infrastructure that is not only used for one specific policy, but also in other policy areas (e.g. the secure document exchange platform Open e-TrustEx[11] used by different authorities to exchange electronically information with other entities in a secure way).

4. **What are the possible technical scenarios that can support the achievement of the policy objective(s)?**

For each policy option, the viable technical scenario(s) should be identified. Each scenario should provide a description of the main functional and non-functional requirements of the ICT solutions for implementing the policy option(s). While one technical scenario can be defined for several policy options, different technical scenarios can also be implemented by one policy option. When defining the technical scenarios, the following should be taken into account:

[9] Report from the Commission to the European Parliament and the Council, Report on the application of Regulation (EU) No 211/2011 on the citizens' initiative, Brussels, 31.3.2015.
[10] European Criminal Records Information System (ECRIS) was created in April 2012 to facilitate the exchange of information on criminal records throughout the EU.
[11] A secure document exchange platform, Open e-TrustEx.

- **Coherence with EU legislations and guidelines on ICT** – The European Institutions provide several rules and guidelines on eGovernment, interoperability and ICT in general, especially those of cross sectoral nature such as the General Data Protection Regulation (GDPR)[12] with regard to the processing of personal data and free movement of such data, eIDAS[13] in the area of electronic identification. The complete list of legislations and guidelines is available in the eGovernment factsheet for the EU[14].
- **Reusability** – Reusing existing ICT solutions will minimise cost and accelerate the implementation time. 'Appendix 2 ICT solutions reuse potential' of the Better Regulation Toolbox (Tool #27) gives an indicative list of potential reusable EC solutions.
- **Interoperability** – In case the new EU initiative requires interoperability between administrations at national and EU levels, a set of recommendations and principles from the recently revised European Interoperability Framework (EIF)[15] should be taken into account when describing the technical scenarios.
- **Technical feasibility** – Each scenario should be technically feasible to implement. In case of suspected ICT constraints that could be a blocking point to the initiative, a technical feasibility study should be performed.

Step 2 Describe the technical scenarios

The second step of an ICT Impact Assessment is to describe each technical scenario identified in step 1. The greater is the amount of information known at the time of describing of the technical scenarios, the greater is the precision of the ICT Impact Assessment. Table 1 presents a set of questions that help to describe each identified technical scenario.

Table 1 Guidance on describing technical scenarios

A. ICT solutions
A1. Is the use of specific ICT solutions required for the implementation of a technical scenario?
A2. Should the technical scenario consider the reuse of existing ICT solutions?
A3. Should the technical scenario consider the development of new ICT solutions?
A4. Should the technical scenario consider the migration of existing ICT solutions?
A5. What are the constraints to implement the technical scenario (e.g. time, legal)?

[12] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).
[13] Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC.
[14] The eGovernment factsheets are meant to present an overview of the eGoverment status in 34 countries and the European Union and not to be exhaustive in its references and analysis. The full list of eGovernment factsheets is available on Joinup.
[15] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, European Interoperability Framework – Implementation Strategy, Brussels, 23.3.2017, COM(2017) 134 final.

B. Business processes and information flows

B1. With the implementation of the technical scenario, which of the existing business processes and information flows will be automated, semi-automated, or manual?

B2. With the implementation of the technical scenario, which of the new business processes and information flows will be automated, semi-automated, or manual?

B3. What are the functional requirements related to the ICT solutions?

B4. What are the non-functional requirements related to the ICT solutions (e.g. functional suitability, reliability, performance efficiency, usability, security, compatibility, maintainability, portability)?

In order to have a clear view on the existing and future processes, roles and responsibilities of stakeholders and the related information flows, it is recommended to modell these information flows and business processes. This could also include estimating number of transactions, number of users, volume of data exchanged, frequency of data exchanges, etc.

C. Data management

C1. Which parties are involved in the data exchange?

C2. Which party has the ownership of the required data?

C3. Is the data required for the technical scenario available?

C4. Is there any requirement on data models (e.g. xml schemas)?

C5. Is there any requirement on reference data (e.g. codelists, taxonomies, dictionaries, vocabularies)?

C6. Is there any requirement with relation to data format (e.g. XML, CSV)?

C7. Is there any requirement for converting data from one format to another?

C8. Is there any requirement to ensure the confidentiality, integrity, protection and/or authentication of the data involved?

C9. Is there any requirement on data storage?

C10. Does the technical scenario refer to a national base register?

Treat sensitive data with care. If any technical scenario refers to such a need it is highly possible that special IT measures should be taken to ensure exchange, integrity and confidentiality of this data, such as encryption, secure hosting, limited access, etc.

D. ICT Specifications/Standards

D1. Does the technical scenario refer to any European, international or national ICT specification(s)/standard(s)?

D2. What ICT specification(s)/ standard(s) could be used for the implementation of the technical scenario?

Standards are specifications widely accepted by users and adopted by several vendors. Standards are critical to the compatibility of hardware, software, and everything in between.

For more information regarding technical scenarios, please consult 'Appendix 1 Detailed guidance on how to identify digital issues and develop digital options' of the Better Regulation Toolbox (Tool #27). You can also consult the real case of the European Criminal Record Information System[16,17], which defines and develops several technical scenarios. There is no one-size fits all methodology for technical scenarios development, since it depends on the specific initiative subject to an ICT Impact Assessment. Useful methodologies of how to define the technical scenarios are presented in Annex III.

Step 3 Define the assessment criteria

The third step of an ICT Impact Assessment is to define the assessment criteria against which to compare and assess the technical scenarios. In line with the Better Regulation Guidelines, the main assessment criteria are effectiveness and efficiency. Additional ones, such as the technical feasibility, coherence, relevance and EU added value of the technical scenarios, may be introduced as needed.

- **Efficiency –** this criterion aims to identify the 'least-costly' technical scenario that satisfies the policy objectives with the minimum expenditure of time and effort.
- **Effectiveness –** this criterion aims to identify the technical scenario that delivers the 'best-value-for-money' satisfying the policy objectives;
- **Technical feasibility –** this criterion aims to identify the technological and technical constraints that may not allow for the implementation and / or monitoring of the technical scenario. The 'technical feasibility' criterion relates to the following quality criteria: functional completeness, performance, compatibility, usability, portability, security, complexity. Technical scenarios proposed should comply with requirements such as the IT system software and quality ones derived from ISO/IEC/ 25010.2011[18].
- **Coherence –** this criterion aims to identify the technical scenario which is the most aligned with overarching EU objectives, strategies and priorities;
- **Relevance –** this criterion aims to identify the technical scenario which is the most pertinent to address the policy problem and reach the policy objectives; and
- **EU added value** – this criterion aims to identify the technical scenario which would achieve the greatest amount of value for the EU, in comparison with the other scenarios and with what could be achieved by Member States at national and/or regional levels.

In the cases when more than one assessment criteria is defined, the **principles of a multi-criteria analysis**[19] should be followed. The use of multi-criteria analysis implies the assignment of weights to each

[16] Feasibility study on the inclusion of pseudonymised fingerprints in ECRIS TCN exchanges, Brussels 2016.
[17] Feasibility study and cost assessment of the establishment of a centralised ECRIS TCN solution, Brussels 2017.
[18] ISO/IEC 25010:2011(en) Systems and software engineering, Systems and software Quality Requirements and Evaluation (SQuaRE), System and software quality models.
[19] Better Regulation Toolbox, complementing, Commission Staff Working Document, Better Regulation Guidelines SWD(2017) 350, Brussels, 7.6.2017. Tool #63 Multi-Criteria Analysis.

assessment criteria, to reflect their relative importance in the comparison of the technical scenarios. Useful methodologies of how to define the assessment criteria are presented in Annex III.

The ICT Impact Assessment recommends the use of multi-criteria analysis to assess and compare different technical scenarios. The Weighted Sum Method (WSM) is used to identify the preferred scenario. WSM aims at designating a preferred scenario, to classify alternative scenarios in a small number of categories and/or to rank them.

WSM implies that the assessment score of a technical scenario is equal to the weighted sum of its evaluation ratings (for each criterion or sub-criterion identified), where the weights are the importance associated with each criterion.

In this regard, **each criterion (or sub-criterion) should be weighted**. Participatory techniques, e.g. workshops or brainstorming sessions, involving policy and IT officers should be employed not only in the definition of the assessment criteria, but also on the definition of their importance and subsequent weighting.

Step 4 Identify the affected stakeholders

The fourth step of the ICT Impact Assessment is to identify stakeholder[20] groups affected by the implementation of the technical scenario(s). The identified stakeholder groups should be described in terms of role, size, and the potential impact of the technical scenario(s) on them.

While the identification occurs at stakeholder group level, it can also be pushed further by analysing individual stakeholders belonging to the same group (segmentation), in order to ensure results that are more accurate. For instance, the stakeholder group 'European Institutions' can be decomposed into Directorate Generals and European Agencies, as they may not all be impacted in the same way by an initiative. Common stakeholder groups that may be considered when conducting ICT Impact Assessments are the following ones: European Commission and other European Institutions; National Component Authorities; Business associations; Business, and in particular SMEs; IT vendors; Standardisation organisations; Academic bodies; Private or public research organisations and Citizens associations.

Following the identification of the affected stakeholder groups, all potential ICT impacts presented as regulatory cost and benefits should be mapped according to the affected stakeholders. For more information regarding the specific regulatory costs and benefits typologies, refer to Tool #58 Typology of costs and benefits of the Better Regulation Toolbox[21].

Identifying affected stakeholder groups is the basis to define the ICT cost-benefit model and will drive the data collection methods to be used during the ICT Impact Assessment. It is thus essential to identify all

[20] In this context, a 'stakeholder' is any individual or entity impacted, addressed or otherwise concerned by an EU intervention. In this regard, identification of the affected stakeholders provides a means to identify the relevant stakeholders who have a 'stake' or interest in the assessment under consideration and make clear how these are affected by the ICT impacts and will be concerned by the initiative.
[21] Better Regulation Toolbox, complementing, Commission Staff Working Document, Better Regulation Guidelines SWD(2017) 350, Brussels, 7.6.2017. Tool #58. Typology of costs and benefits.

stakeholder groups affected by the ICT impacts of the initiative. Useful methodologies of how to analyse stakeholders are presented in Annex III.

Step 5 Define the cost and benefit models

Given that efficiency and effectiveness are the most common criteria assessed in an ICT Impact Assessment, the fifth step of an ICT Impact Assessment is to define the cost and benefit models for each of the identified technical scenarios. The main aspects are summarised below:

- Create a Work Breakdown Structure (WBS) for each technical scenario.
- Identify costs to each element of the WBS using the cost taxonomy from VAST[22] (i.e. infrastructure (software and hardware), development, maintenance, support and training) to estimate the cost per technical scenario;
- Identify ICT benefits using the benefits taxonomy indicated in Tool #58 'Typology of costs and benefits of the Better Regulation Toolbox[21]' (i.e. improved well-being and market efficiency, indirect compliance benefits, wider macroeconomic benefits and other non-monetisable benefits).

Costs

In order to build the **cost model,** each technical scenario should be broken down into WBS elements. Each WBS element corresponds to a group of functional and non-functional requirements. These requirements should be identified during the description of the technical scenarios (Step 2, Table 1, questions B3 and B4). Each WBS element is linked to the specific cost categories from VAST. Subsequently, the WBS elements are linked to the stakeholder groups who would incur the costs of its implementation.

Following VAST, five categories of costs should be analysed while defining the ICT cost model of each technical scenario:

- **Infrastructure costs** provide the total (anticipated) cost of the hardware (e.g. network, servers, storage) and software (e.g. licences, libraries) required to develop, support, operate and maintain the online collection system;
- **Development costs** provide the total (anticipated) cost (human resources) for the development of the system (e.g. analysis and process re-engineering activity, coding activity, project management activity, test activity, configuration & change management activity, deployment activity);
- **Maintenance costs** provide the total (anticipated) cost (human resources) in person days per year to maintain the system (e.g. activities related to both corrective maintenance and evolving maintenance);
- **Support costs** provide the total (anticipated) cost (human resources) in person days per year to

[22] Value Assessment Tool guidelines, European Commission, Directorate-General for Informatics, 2010.

support the system, its users and end-users (helpdesk);

- **Training costs** relate to the costs to train systems' users.

The sum of these costs aims to provide an estimate of the Total Cost of Ownership[23] (TCO) related to each technical scenario assessed.

While defining these costs, one should take into account whether these costs are investment or operating costs. Investment or set-up costs are **one-off costs** incurred at the development (implementation phase) of a project only; whereas operating costs are **ongoing costs** related to the operation (operational phase) of a solution and its improvements.

An alternative, more aggregated cost model would be to differentiate among capital / fixed costs (**CAPEX**), operating and maintenance costs (**OPEX**) and financial costs[24].

Another dimension defined in the cost model is the number of years taken into account in the ICT Impact Assessment. The number of years should include the duration for the implementation of the technical scenarios and the subsequent years of operation. Useful methodologies of how to define cost and benefit models are presented in Annex III.

Benefits

In order to build the **benefit model**, it is necessary to first identify all the benefits related to each technical scenario and for each stakeholder group. In accordance with the Better Regulation Guidelines and Toolbox 2017, each benefit identified should then be mapped to a corresponding category of benefits, whether direct, i.e. improved well-being and market efficiency, or indirect, i.e. indirect compliance benefits, wider macroeconomic benefits and other non-monetisable benefits.

Each type of benefits should finally be described, at least qualitatively and, when possible, quantitatively, as these will provide inputs when comparing the technical scenarios against a set of assessment criteria. The assessment of the benefits may, for instance, contribute to the evaluation of a technical scenario's efficiency (e.g. reduction in IT costs), effectiveness (e.g. increased citizens' satisfaction), value for EU (e.g. saved time), coherence, relevance or technical feasibility. Useful methodologies of how to define cost and benefit models are presented in Annex III.

[23] The TCO of an information system defines the total estimated cost to develop the system, to put it into production, to operate it, to support it, to maintain it, to phase it out at the end, etc. The cost estimation should be as comprehensive as possible and include all costs from the very inception of the system until its phase out.
[24] Assessing the costs and benefits of regulation, a CEPS – Economisti Associati study for The European Commission, 2013.

VAST[22] can be used to identify the qualitative benefits of a technical scenario, as it provides a set of key questions aimed to assess the value of the technical scenario for the EU. VAST can also be used to estimate the benefits in monetary value, as it includes a specific tool aimed at assessing saved time, reduction in IT costs and direct operating costs, and qualitatively.

This information may be valuable inputs when comparing the technical scenarios against a set of assessment criteria.

Step 6 Define the data collection strategy

The sixth step of an ICT Impact Assessment is to define the data collection strategy. The most appropriate data collection methods to estimate costs and benefits should be selected according to the defined technical scenario(s), defined assessment criteria and identified stakeholder group(s). Ideally, the data collection strategy should be synchronised with the phases of the targeted and open public consultation during the IA process.

Consulting those who will be affected by a new policy or initiative and including those who will implement it as a regulatory obligation, is essential for producing high quality and credible results. Synchronising the data collection strategy with the targeted and open public consultation helps to ensure that policies are effective and efficient, and it increases the legitimacy of EU initiative from the point of view of stakeholders and citizens.

In this regard, the stakeholder group(s) impacted by the technical scenarios should be consulted. Depending on these groups, in particular their size and the types of impacts of each technical scenario on them, specific data collection method(s) can apply, as illustrated in Figure 4 and detailed below.

Figure 4 Data collection methods

Desk research, which involves the summary, collation and/or synthesis of secondary data, aims not only to obtain a clear picture of the field of study at the inception phase but also to verify the primary data collected along the assessment. In other words, desk research is the instrument needed to screen and collect legal, policy, and technical information from documentation available at national and EU level. These could be monitoring or evaluation reports from previous or similar programmes, statistical data from Eurostat, studies carried out by or for the Commission, results of consultation documents such as Green Papers, good practice in Member States, internationally agreed standards, etc. Desk research also helps to validate the primary data collected via other data collection methods, such as interviews and surveys.

At the inception stage, the desk research should result in a selection of the most relevant documents to consult during the assessment of ICT impacts. During the analysis phase, desk research will be used to perform quality controls on the primary data collected.

Interviews are the tool used in order to collect information directly from the stakeholders having a direct stake in the assessment. The interviews rely on the desk research findings, more precisely on the areas identified as 'to be investigated'. As a data collection method, interviews provide in-depth information on explaining the reasoning leading to certain actions and describing the phenomena in question (i.e. answering to question types "How?" and "Why?").

Different types of interviews can be conducted. A distinction needs to be made between structured, semi-structured and non-structured interviews:

- **Structured interviews** are supported by an interview guide, i.e. a rigorous set of questions, which does not allow one to divert;
- **Semi-structured interviews** are supported by a framework of themes to be explored, so as to allow new ideas to be brought up during the interview as a result of what the interviewee says; and
- **Unstructured interviews** are more informal and free flowing than the other types of interviews, as questions are not prearranged upfront but rather developed during the course of the interview, based on the interviewees' responses.

The use of each method depends on the purpose of the interview and the nature of the needed information. However, in the case of an assessment of ICT impacts, structured interviews should be conducted, supported by an interview guide tailored for each type of stakeholder group to be interviewed. The interview guide builds on the desk research findings, more precisely on the areas identified as to be investigated, and on the ICT cost-benefit model.

In order to ensure the good preparation of both parties, the interview guide should be submitted at least three days in advance to the interviewees. It is also recommended to disseminate the minutes to the interviewees within two days after the interview and ask for their review within five days after the submission.

At the inception stage, the list of stakeholders to interview should be established and the purpose of the interview clearly defined.

Questionnaire surveys aim at collecting data from a sample of the population, through a structured, limited set of questions, in order to quantify data. It is indeed a powerful research instrument to provide quantitative figures on a phenomenon or a perception. Questionnaire surveys should be built based on the pre-analysis of the data collected from the interviews e.g.: the interview questions not answered by interviewees should be reformulated or deleted; based on the answers received from the interviews, open questions should be turned into closed questions with a list of proposed answers.

In order to assess the validity of a questionnaire, it is recommended to proceed with a pilot-test addressing a restricted sample of respondents from or similar to the target population ('face validity') prior to launching it to the full sample of recipients. Pre-testing is indeed another opportunity to verify the questions' relevance, formulation, flow and any technical issues. It will also allow assessing whether the survey is too long and whether respondents are losing interest in the course of the survey.

In order to have a response rate sufficiently high to ensure a good representation of the target population and thus reliable results, a reminder should be sent to the respondents, two weeks after the survey is sent.

At the inception stage, the list of stakeholders to survey should be established and the purpose of the survey clearly defined.

Workshops are proved to be a very efficient and effective format for gathering expectations and feedbacks from different stakeholder groups.

The main objective of organising a workshop within the lead DG during the inception phase of an ICT Impact Assessment is to ensure that all parties understand and agree on the problem driver(s), objective(s) and scope of the assessment.

The main objective of organising a workshop during the final phase of an assessment is to ensure quality control. In fact, this does not only allow generating perception data that can be used for triangulation[25] along with desk research and interviews data, but more importantly, it can prompt a deeper discussion to justify and explain the assessment results.

In any case, the format of the workshop should be participatory, leveraging e.g. interactive voting tools to improve the participation and engagement of the stakeholders in the study. This can bring additional value compared to the more traditional methods such as lectures or presentations.

At the inception stage, the list of stakeholders to invite to the inception workshop should be established and the purpose of the workshop clearly defined.

Even though more data collection methods exist, like focus groups or the Delphi method, the four data collection methods, listed above, are the most commonly used and therefore recommended for the assessment of ICT impacts.

[25] Triangulation of data is defined according to the practical guide for the Commission services on how to 'Evaluate EU activities', as 'the use of data collected using different tools and from different sources, and/or analysis from different theoretical perspectives and by different analysts, and at different time'.

Step 7 Collect and analyse data

The seventh step of an ICT Impact Assessment is to collect and analyse the data. At this stage, all the necessary elements needed to collect and analyse data on the ICT impacts are defined and agreed upon, i.e. the technical scenarios, assessment criteria, affected stakeholders, cost-benefit model and the data collection strategy. In this step, the ICT Impact Assessment team puts in practice the data collection strategy.

In case questionnaire surveys and interviews are used, the interview guides/questionnaires should be designed in a way that ensures that questions cover all the costs and benefits items defined in the cost-benefit model.

Taking into account that quantitative inputs may be difficult to obtain, qualitative questions should also be addressed to stakeholders when it comes to assessing costs or benefits. For example, one could ask to 'estimate the costs to establish a connection using File Transfer Protocol (FTP[26])' but if this is difficult to assess address another question such as to 'rate the complexity to establish a FTP connection from 1 to 5 (1 being the most complex and 5 the least complex)'.

Additionally, as it is usually easier to assess costs than benefits, particularly as far as their monetary value is concerned, one may be willing to use other techniques than consultation for estimating benefits, e.g.: comparison to a historical case or use of a proxy.

Once the data is collected, it is essential to verify its coherence, reliability and validity, by applying different methods, using different data sources and/or consulting different experts (triangulate[25]). The RACER (Relevant, Accepted, Credible, Easy to monitor, and Robust against manipulation) technique can be used to control data quality.

With regard to ensuring reliability, the following aspects should be taken into account:

- **Scientific quality**: metrics, calculation methods and the presentation of results should be performed using scientific methods of the highest quality;
- **Full transparency**: the data collection and calculation methods should be clear, fully documented (within the ICT Inception report) and the raw data should be made available. This last criterion is a necessary condition to ensure the quality of the data.

In addition, the assessment questions should be looked at from different standpoints and by different methods (triangulation of methods). Using a mix of qualitative and quantitative methods allows the drawing of robust conclusions from findings. For instance, desk research can be a way to verify the data collected via interviews and questionnaire surveys. The quantitative inputs received via the latter data collection methods

[26] A Transmission Control Protocol/Internet Protocol (TCP/IP) standard used to log onto a network, list directories and copy files. That is, it provides authentication of the user and lets users transfer files, list directories, delete and rename files on the foreign host, and perform wild-card transfers. Source: Gartner IT glossary.

could be compared to similar initiatives, using Commission's tools such as GovIS2[27]. Useful methodologies of how to collect and analyse data are presented in Annex III.

Accessibility: in principle, all evidence gathered should be made available to the public. Unless data includes confidential elements, it is recommended that it is made available via the EU Open Data Portal[28], which provides a single point of access to a growing range of data produced by the institutions and other bodies of the European Union. Such information has a significant potential, not just to increase transparency, but also through its re-use, to produce new products or services and efficiency gains in administrations. Facilitating access to public data will also foster the participation of citizens in policy-making processes.

Step 8 Compare the technical scenarios and make recommendations

The last step of an ICT Impact Assessment is to compare the technical scenarios and to make recommendations. Based on the outcomes of the data collection and analysis performed in Step 7, one should be able to provide the results (e.g. costs/benefits, advantages/disadvantages) of the assessed technical scenarios. The outcome of an ICT Impact Assessment may depend on assumptions, which by nature will have a degree of uncertainty attached to them. Uncertainty should therefore be taken into account in the formulation of the results of the assessment. Assumptions can be general and applicable to the overall ICT Impact Assessment (e.g., assumed labour daily rates) or specific and applicable to one WBS item (e.g. the central IT system is not expected to be upgraded before the first 5 years of operation). In both cases, the ICT Impact Assessment report should explicitly state all assumptions.

Sensitivity analysis should be used to reduce uncertainty.

Sensitivity analysis involves considering a range of possible values of one key variable or factor which is likely to affect the outcome of the regulations; obviously this technique can also be applied to several (but, in practice, not many) factors at the same time.

Moreover, a social discount rate should be used to convert all costs and benefits to "present values" so that they can be compared, as explained further in the Better Regulation Toolbox[29].

Taking into account the key findings from the data analysis and the weighting attributed to each assessment criterion (and sub-criterion), the following distinctions should be made:

- Assessment criteria could be of both types: quantitative and qualitative.
- For quantitative assessments, estimate the monetary value (e.g. net benefits as the sum of monetised benefits minus the sum of monetised costs). This is usually the case for efficiency, some or all of effectiveness, as well as for other assessment criteria as appropriate;

[27] Governance Information System (or GovIS) is a system open to all Commission officials which gives access to available information on the European Commission's information systems and the related projects for their evolution.
[28] The European Union Open Data Portal (EU ODP) provides access to open data published by EU institutions and bodies.
[29] Better Regulation Toolbox, complementing, Commission Staff Working Document, Better Regulation Guidelines SWD(2017) 350, Brussels, 7.6.2017. Tool #57. Analytical methods to compare options or assess performance.

- In any case, use a scoring mechanism from 1 (lowest) to N (highest) in order to rank the technical scenarios against each sub-criterion and criterion.

'N' corresponds to the number of scenarios assessed: if three (3) technical scenarios are compared, the scoring mechanism should go from 1 (lowest) to 3 (highest=most favoured); if four (4) technical scenarios are compared, the scoring mechanism should go from 1 (lowest) to 4 (highest).

Annexes

Annex I. Governance

The goal of the ICT Impact Assessment is to ensure that ICT impacts of new Commission initiatives are assessed before the adoption of a new initiative by the Commission (i.e. Commission proposal)[30], or when reviewing existing EU policies.

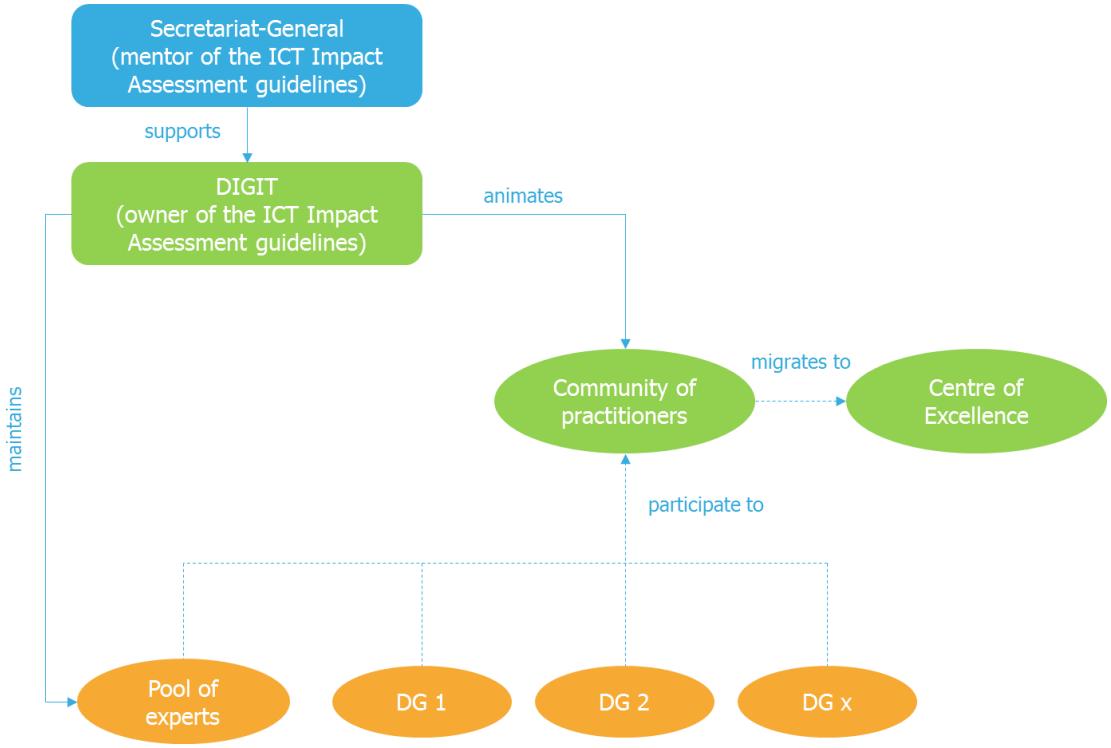
In order to achieve this goal, collaboration between policy, legal and ICT experts from different Commission DGs and services is required from the start of the policy development until the adoption of the legislation. This collaboration should result in a common understanding of the objectives of the initiative and an agreement on the options and corresponding technical scenarios to reach these objectives in the most efficient and effective way.

This annex describes the governance of the ICT Impact Assessment Guidelines and individual ICT Impact Assessments, including the roles, responsibilities and interactions of the different stakeholders involved.

Governance of the ICT Impact Assessment Guidelines

In view of the governance of the ICT Impact Assessment Guidelines, four main roles can be distinguished, as presented in Figure 5. This annex describes each of these roles and the interactions between them to facilitate the ICT Impact Assessment.

Figure 5 Governance of the ICT Impact Assessment Guidelines



[30] A revision of the estimated ICT impacts is necessary in case of substantial amendments made by the European Parliament and Council to Commission proposals.

Secretariat-General (mentor of the ICT Impact Assessment Guidelines)

The Better Regulation Guidelines refer to and include a specific tool on the ICT Impact Assessment of future or existing policies. The Secretariat-General supports and promotes across the Commission DGs and services, the need for and importance of considering ICT impacts when developing or evaluating a policy.

DIGIT (owner of the ICT Impact Assessment Guidelines)

DIGIT is responsible for (i) updating and maintaining the guidelines (based on the inputs received from the Community of practice, in particular); (ii) providing support (consultation, training, etc.) to Commission units willing to use the guidelines; (iii) and defining a communication strategy for increasing awareness on and stimulating the use of the guidelines. DIGIT should exercise its role as the 'digital leader' in the governance of the guidelines.

Pool of experts

DIGIT needs to establish and maintain a pool of experts. Trained on the ICT Impact Assessment Guidelines, these resources (from DIGIT and other DGs) are available to support policy units willing to assess the ICT impacts of their initiative.

The pool of experts creates the connection between the IT service and policy units by bringing their view on IT to the policy DGs as well as to gain knowledge and experience from the policy DGs in their field of expertise. Their experience of following these guidelines should therefore be shared with other practitioners in a Community of practice.

Community of practitioners (and Centre of excellence)

DIGIT establishes and animates a community of practitioners. While resources from the pool of experts should participate in this community, the latter should also be composed of the DGs having used the ICT Impact Assessment Guidelines on their own initiatives and, ideally, those producing many policies as their expertise may be valuable to the community.

The objective of the Community of practitioners is firstly to facilitate ICT Impact Assessments within the different Commission DGs and services, based on the experience from those having applied the guidelines. Secondly, the objective is to provide inputs on the guidelines by ensuring that practitioners share their experiences on the use of the guidelines with a common goal to improve it.

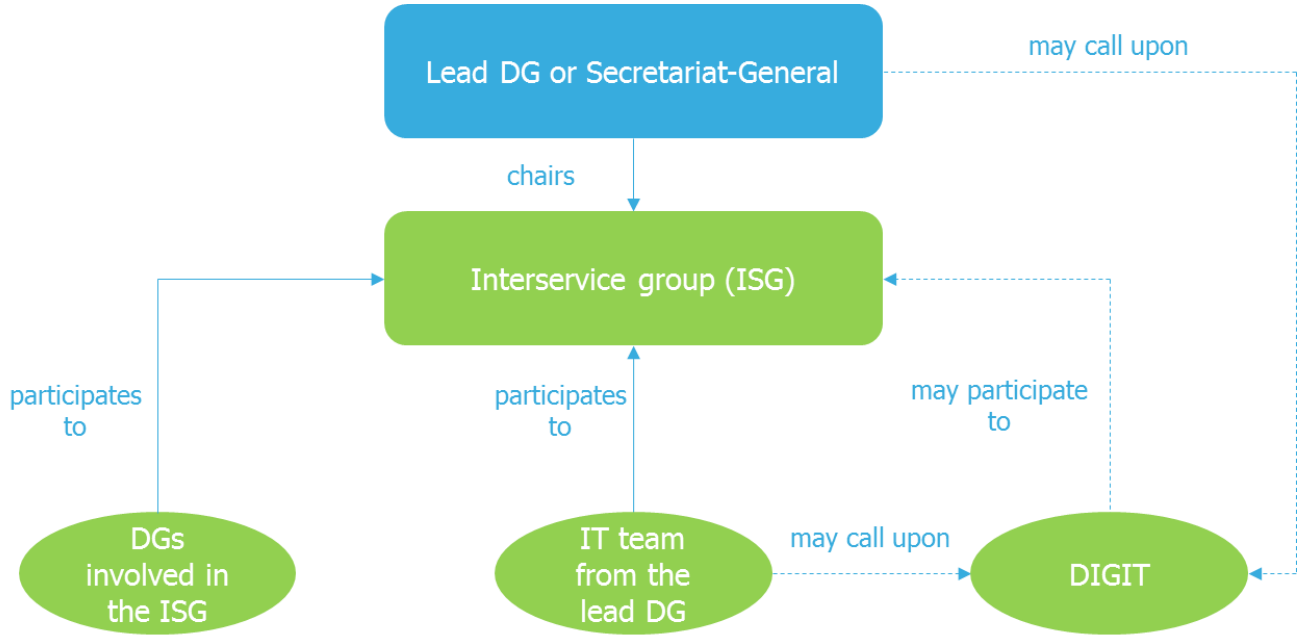
In the long-term (5 years), the Community of practitioners could migrate to a Centre of Excellence that has enough professional competence and organisational capacity to guide and perform the ICT Impact Assessment function for the whole of the Commission.

Governance of individual Impact Assessments

As mentioned in the introduction of this annex, the governance of individual assessments should be based on the existing IA governance. In this regard, the lead DG, Secretariat-General, and the Inter-service Group (ISG, which includes DGs having a specific interest or expertise in the initiative) play a role in this governance. Two additional bodies not always involved in IA processes complement this structure for the ICT Impact Assessment specifically: i.e. IT team from the lead DG and DIGIT, as highlighted in green in Figure 6 below.

This annex describes each of these roles and the interactions between them to facilitate the ICT Impact Assessment.

Figure 6 Governance of individual assessments



Inter-service Group (ISG)

The ISG comprises Commission representatives from more than one DG or service. In fact, all DGs with policies likely to be affected by the initiative or that will contribute to the objectives of the initiative should be invited to participate to the ISG, along with the relevant policy coordination unit of the SG and the Legal Service. In addition, DGs with core expertise in specific areas should participate where appropriate to ensure that the IA calls upon all relevant expertise in the Commission services. The specific areas to be considered are economic analysis (e.g. DG ECFIN), scientific research and analytical models (e.g. JRC), social impacts (e.g. DG EMPL), SMEs, competitiveness (e.g. DG GROW), environment (e.g. DG ENV), fundamental rights (e.g. DG JUST), etc.

In general, the role of the ISG is to steer the IA process and collectively prepare the IA report. The ISG should review all key elements of the IA and the policy initiative, including the ICT Impact Assessment findings before submitting it for approval to the Regulatory Scrutiny Board and launching the inter-service consultation.

The lead DG and ISG should constantly check the quality of the work being undertaken for the ICT Impact Assessment, ensuring that it is evidence-based and free from bias. In this regard, they should be involved all along the ICT Impact Assessment, and in particular:

- During **Step 1**, **Step 2**, **Step 3** and **Step 4** the lead DG and ISG should ensure a common understanding of the policy problems and objectives and verify the compliance of the technical scenarios to further assess with the policy objective.
- During **Step 5, Step 6, Step 7** and **Step 8**, to make sure that robust and reliable research, data collection and analysis must be conducted.

IT team from the lead DG and/or DIGIT

Based on the results from the Digital Screening, the lead DG may decide to invite members from the lead DG internal IT or DIGIT to participate in the ISG. These ICT experts will then be responsible for the ICT Impact Assessment of the initiative, including the production of the ICT Inception and ICT Final reports, under the supervision of the ISG.

Annex II. ICT Impact Assessment templates

In order to support the ICT experts going through a detailed ICT Impact Assessment, three main templates (pre-assessment checklist, ICT Inception report and ICT Final report) aim to provide additional guidance to policy makers and ICT experts in the application of the ICT Impact Assessment Guidelines:

- **Pre-assessment checklist**: list of high-level questions to policy units of the lead DG to specify the ICT impacts identified during the digital screening and to help decide whether there is a need of a more detailed ICT Impact Assessment. The pre-assessment checklist is filled in by the lead DG and it is used as a starting point for preparing the ICT Inception report. The pre-assessment checklist template is available here:

Pre-Assessment Checklist template fina

- **ICT Inception report**: it serves as a starting point for defining the scope and preparing an ICT Impact Assessment. It is based on a template that should be filled-in by ICT experts and ideally submitted for review to the ISG before the actual assessment of ICT impacts. The ICT Inception report template is pre-formatted so as to follow the eight-step methodology of the guidelines as presented in chapter 3 of the ICT Impact Assessment Guidelines. This template serves as a starting point for: **Step 1** 'Define the scope of the ICT Impact Assessment', **Step 2** 'Define the technical scenarios', **Step 3** 'Define the assessment criteria', and **Step 4** 'Identify the affected stakeholders'. The ICT inception report template is available here:

ICT Inception Report template final.docx

- **ICT Final report**: based on the key findings from the assessment, this report should provide policy-makers with clear evidence-based results to support decision-making on the preferred policy option (and related technical scenario). It is based on a template that should be filled-in by ICT experts and ideally submitted for review to the ISG at the end of the ICT Impact Assessment. The ICT Final report template is pre-formatted so as to build up on the ICT Inception report and it serves to complete **Step 5** 'Define the ICT cost-benefit model', **Step 6** 'Define the data collection strategy', **Step 7** 'Collect and analyse data', and **Step 8** 'Compare the technical scenarios and make recommendations'. The ICT Final report template is available here:

ICT Final Report template final.docx

Annex III. Methodological guidance

This section presents some useful tools, tips and best practices that could help the lead DG to conduct an ICT Impact Assessment for each step defined by these guidelines.

Step 1 Define the scope of the ICT Impact Assessment

To better frame the scope of the ICT Impact Assessment, the lead DG responsible for conducting the IA should answer the questions presented in the first step of this guidelines, and complete the 'Pre-Assessment checklist' presented in Annex II.

Step 2 Describe the technical scenarios

To describe the technical scenarios, it is important to clarify each policy option and how ICT can be leveraged. This can be done by using a 'policy matrix' (Table 2) that maps the links between all identified policy options with the related ICT impacts. It describes how ICT can leverage the implementation of each policy option.

Table 2 Matrix for describing the policy options

Policy Option code (PO)	Policy Option Short Title (POST)	Description	ICT leverage
PO01	<POST01>	< Description of the policy option >	< Description of how ICT can leverage the implementation of the policy option >
PO02	<POST02>	**…**	**…**
PO03	<POST03>		
…	**…**		

The lead DG should then describe each technical scenario in relation to the policy options defined for a specific Commission initiative. For this purpose, the matrix provided by Table 3 can be used.

Table 3 Matrix for describing the technical scenarios

Technical Scenario code (TS)	Technical Scenario Short Title (TSST)	Description	Related Policy Option (code and Short Title)
TS01	<TSST01>	< Description of the technical scenario, including a list of main requirements[31] >	< List of policy options for which the technical scenario can be used : *PO-<POST>*
TS02	<TSST02>	…	…
TS03	<TSST03>		
…	…		

[31] Requirements can be business, functional or non-functional, depending on the amount of detail available to perform the ICT Impact Assessment.

Step 3 Define the assessment criteria

To compare the different technical scenarios, it is advised to use specific criteria, primarily efficiency and effectiveness, in line with the Better Regulation Guidelines 2017. Additional ones, such as the technical feasibility, coherence, relevance and EU added value of the technical scenarios, may be introduced as needed.

In some cases, you may drill down each criterion into sub-criteria (when possible) and assign a weighting (w_j) to each of these sub-criteria[32]. The sum of these weightings will provide the weighting at criterion level. The tabular overview provided by Table 4 can be used to display the list of criteria, sub-criteria and their related weightings.

Table 4 Summary of the list of assessment criteria and related weightings

Weighting (assessment criteria)	Assessment criteria	Weighting (sub-criteria)	Sub-criteria
W_1	Efficiency	N/A	N/A
$W_2 = \sum_{m=1}^{M_2} w_{2,m}$	Effectiveness	$w_{2,1}$	< Name and description of sub-criterion N°1 >
		$w_{2,2}$	< Name and description of sub-criterion N°2 >
		w_{2,M_2}	< Name and description of sub-criterion N°M_2>
$W_K = \sum_{m=1}^{M_k} w_{K,m}$	< Name and description of the assessment criterion N°K>	$w_{K,1}$	< Name and description of sub-criterion N°1 >
		w_{K,M_k}	< Name and description of sub-criterion N°M_k >

Step 4 Identify the affected stakeholders

Based on the different stakeholder groups affected (either positively or negatively) by the policy options, profile the ones who will be specifically affected by the technical scenarios (e.g. size and role of each stakeholder group, description of how they are affected by the technical scenarios).

The profile of each stakeholder group can be summarised using Table 5.

Table 5 Summary of the stakeholder groups

Stakeholder Group code (SG)	Stakeholder Group Name (SGN)	Size of the stakeholder group	Description of the stakeholder group
SG01	< SGN01 >	< Size of the stakeholder group N°01 (in number of persons)>	< Description of the role of the stakeholder group N°01 and how the technical scenarios affect them >
SG02	< SGN02 >	…	…
…	…		

[32] If sub-criteria cannot be defined, then weightings should be assigned to the assessment criteria directly.

At the end of this analysis, all potential impacts – positive or negative – should be mapped out according to the specific parties that would be affected. For this purpose, the identified impacts should be mapped to the regulatory costs and benefits described in the Better Regulation Guidelines 2017. A linkage between a regulatory cost or benefit and the related stakeholder group affected can be denoted by ticking ☑ the concerned cell.

The mapping can be performed using Table 6 (for each technical scenario).

Table 6 Regulatory costs and benefits per stakeholder group and technical scenario

Technical Scenario code (TS) and Short Title (TSST): TS-<TSST>					
Category		**Sub-category**	**Stakeholder Group code (SG) and Name (SGN)**		
			SG01-<SGN01>	SG02-<SGN02>	…
COSTS	**Direct**	Direct compliance costs			
		Regulatory charges			
		Substantive compliance costs			
		Administrative burdens			
		Hassle costs			
		Hassle costs			
	Enforcement	One-off adaptation costs			
		Information costs and administrative burdens			
		Monitoring			
		Adjudication			
		Enforcement			
	Indirect	Indirect compliance costs			
		Indirect compliance costs			
		Other indirect costs			
		Substitution effects			
		Transaction costs			
		Reduced competition and inefficient resource allocation			
		Reduced market access			
		Reduced investment and innovation			
		Uncertainty and investment			
BENEFITS	**Direct**	Improved well-being			
		Improved market efficiency			
	Indirect	Benefits from third-party compliance with legal rules			
		Wider macroeconomic benefits			
		Other, non monetizable benefits			

Assuming that ICT costs are mainly substantive compliance costs or indirect compliance costs (as highlighted in Table 6), for the other categories of costs and for all categories of benefits, estimates should be performed in accordance to the Better Regulation Guidelines and Toolbox 2017.

Step 5 Define the cost and benefit models

ICT costs

Table 7 can be used to perform mapping of ICT costs. For one-off costs, a simple linkage between the requirement and the category of costs can be denoted by ticking ☑ the concerned cell. For ongoing costs, the number of years during which the cost is foreseen should be added in the concerned cell

Table 7 Mapping requirements and ICT costs

Requirements	Infrastructure		Development		Maintenance		Support		Training	
	One-off	Ongoing	One-off	Ongoing	One-off	Ongoing	One-off	Ongoing	One-off	Ongoing
TS01										
• <Requirement n°01>	☐	<number of years>	☐	<number of years>	☐	<number of years>	☐	<number of years>	☐	<number of years>
• <Requirement n°02>	☐	…	☐	…	☐	…	☐	…	☐	…
• …	☐	…	☐	…	☐	…	☐	…	☐	…
TS02										
• <Requirement n°01>	☐	…	☐	…	☐	…	☐	…	☐	…
• <Requirement n°02>	☐	…	☐	…	☐	…	☐	…	☐	…
• …	☐	…	☐	…	☐	…	☐	…	☐	…
…										
• <Requirement n°01>	☐	…	☐	…	☐	…	☐	…	☐	…
• …	☐	…	☐	…	☐	…	☐	…	☐	…

At a later stage the ticks and number of years will be replaced by the ICT costs associated to each requirement. These costs will provide an estimate of the Total Cost of Ownership[33] (TCO) for each technical scenario assessed.

ICT benefits

Identify all the benefits related to each technical scenario and for each stakeholder group and map them to their corresponding category of regulatory benefits, as defined in the Better Regulation Guidelines and Toolbox 2017. Table 8 can then be used to describe each type of regulatory benefits, at least qualitatively and, when possible, quantitatively.

[33] The TCO of an information system defines the total estimated cost to develop the system, to put it into production, to operate it, to support it, to maintain it, to phase it out at the end, etc. The cost estimation should be as comprehensive as possible and include all costs from the very inception of the system until its phase out.

Table 8 Benefits per technical scenario (and stakeholder group)

TECHNICAL SCENARIO		
	Qualitative description	**Quantitative description**
Stakeholder group N°1		
Benefits	***Improved well-being***	
	•	•
	Improved market efficiency	
	•	•
	Benefits from third-party compliance with legal rules	
	•	•
	Wider macroeconomic benefits	
	•	•
	Other, non monetizable benefits	
	•	•
Stakeholder group N°X		
Benefits	***Improved well-being***	
	•	•
	Improved market efficiency	
	•	•
	Benefits from third-party compliance with legal rules	
	•	•
	Wider macroeconomic benefits	•
	•	•
	Other, non monetizable benefits	
	•	•

The assessment of the benefits will provide inputs when comparing the technical scenarios against a set of assessment criteria.

Step 6 Define the data collection strategy

Table 9 below maps the identified stakeholder groups with the relevant data collection methods to be used.

Table 9 Mapping of the data collection methods per stakeholder group

Stakeholder Group code (SG) and Name (SGN)	Desk research	Interviews	Online surveys	Workshops	Others
SG01-<SGN01>	☐	☐	☐	☐	☐
SG02-<SGN02>	☐	☐	☐	☐	☐
…	☐	☐	☐	☐	☐

Table 10 below presents the list of documents that should be analysed with desk research.

Table 10 List of documents for desk research

ID	
1	< Title > < Author(s) > < Year of publication > < Country, city of Publisher > < Hyperlink >
2	< Title > < Author(s) > < Year of publication > < Country, city of Publisher > < Hyperlink >
3	…

Table 11 below presents the list of stakeholders who should be consulted, via e.g. interviews, online surveys and workshops.

Table 11 List of stakeholders to consult

Stakeholder Group code (SG) and Name (SGN)	Name/ Surname	Organisation	Data Collection method
SG01-<SGN01>			
SG02-<SGN02>			
…			

Step 7 Collect and analyse data

Explain how you intend to control the quality of the collected data. For instance, you can cross-check the coherence, reliability and validity of the information/data collected, by applying different methods, using different data sources and/or consulting different experts (triangulate).

RACER (Relevant, Accepted, Credible, Easy to monitor and Robust against manipulation) technique can also be used to control data quality, as mentioned in the Better Regulation Toolbox 2017.

- **Relevant:** closely linked to the objectives to be reached (in this case, measured). Relevance indicators should not be overambitious and should measure the right thing (e.g. a target indicator for health care could be to reduce waiting times but without jeopardising the quality of care provided).
- **Accepted:** The role and responsibilities for the indicator need to be well defined (e.g. if the indicator is the handling time for a grant application and the administrative process is partly controlled by Member States and partly by the EU then both sides would assume only partial responsibility).

- **Credible:** Indicators should be simple and robust, unambiguous and easy to interpret. If necessary, composite indicators might need to be used instead – such as country ratings, well-being indicators, but also ratings of financial institutions and instruments. These often consist of aggregated data using predetermined fixed weighting values. As they may be difficult to interpret, they should be used to assess broad context only.
- **Easy to monitor** (e.g. data collection should be possible at low cost).
- **Robust against manipulation:** e.g. if the target is to reduce administrative burdens to businesses, the burdens might not be reduced, but just shifted from businesses to public administration.

Explain how you will analyse the data to come up with an assessment of the (regulatory) costs and benefits of each technical scenario, per group of stakeholders.

Step 8 Compare the technical scenarios and make recommendations

In order to compare the technical scenarios, and determine the preferred scenario, one should evaluate how well each technical scenario meets the assessment criteria previously defined, against the baseline scenario.

For this purpose, the weighted score for each technical scenario should be computed by multiplying each technical scenario rating by the related weighting. Let us assume that we have 'N' technical scenarios and 'K' assessment criteria in our decision-making problem. The preferred technical scenario, P^*, is the one that satisfies the following equation:

$$P^* = \max_{N \geq i \geq 1} \sum_{j=1}^{K} m_{ij} w_j$$

Where m_{ij} stands for the individual score related to the assessment of the technical scenario i against criteria j, and w_j stands for the relative weighting of criteria j.

Based on these computations, recommendations can be made on the preferred policy option(s) (i.e. policy option(s) related to the highest ranked technical scenario(s)). Table 12 shows a way of displaying these results.

Table 12 Comparison of the technical scenarios

Assessment criteria	Weighting	Technical Scenario code (TS) and Short Title N°1 TS1-<TSST 1>	…	Technical Scenario code (TS) and Short Title N°N TSN-<TSST N>
Assessment criterion N°1	w_1	$\sum_{j=1}^{K} m_{ij} w_1$		$\sum_{j=1}^{K} m_{ij} w_1$
Sub-criterion N°1	$w_{1,1}$	$\sum_{j=1}^{K} m_{ij} w_{1.1}$	…	$\sum_{j=1}^{K} m_{ij} w_{1.1}$
Assessment criterion N°2	w_2	$\sum_{j=1}^{K} m_{ij} w_2$		$\sum_{j=1}^{K} m_{ij} w_2$
Sub-criterion N°1	$w_{2,1}$	$\sum_{j=1}^{K} m_{ij} w_{2.1}$	…	$\sum_{j=1}^{K} m_{ij} w_{2.1}$
Sub-criterion N°2	$w_{2,2}$	$\sum_{j=1}^{K} m_{ij} w_{2.2}$		$\sum_{j=1}^{K} m_{ij} w_{2.2}$
Assessment criterion N°K	w_k	$\sum_{j=1}^{K} m_{ij} w_k$		$\sum_{j=1}^{K} m_{ij} w_k$
Sub-criterion N°1	$w_{K,1}$	$\sum_{j=1}^{K} m_{ij} w_{k,1}$	…	$\sum_{j=1}^{K} m_{ij} w_{k,1}$
Total Score				